VOL. XXVII. No. 9 SEPTEMBER 1942

MECCANO MAGAZINE

THE ROYAL MARINES

(see page 306)

6D.

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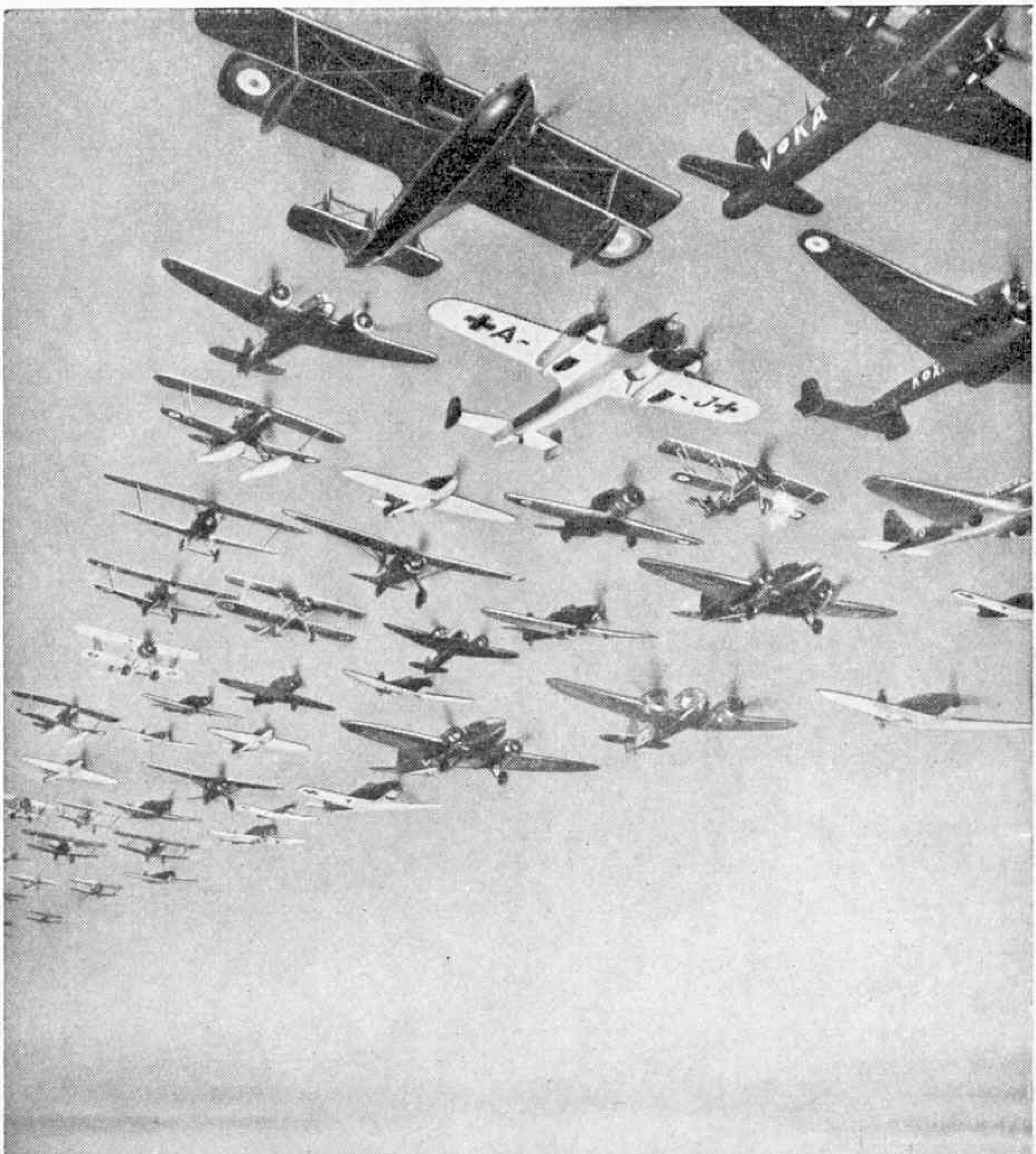
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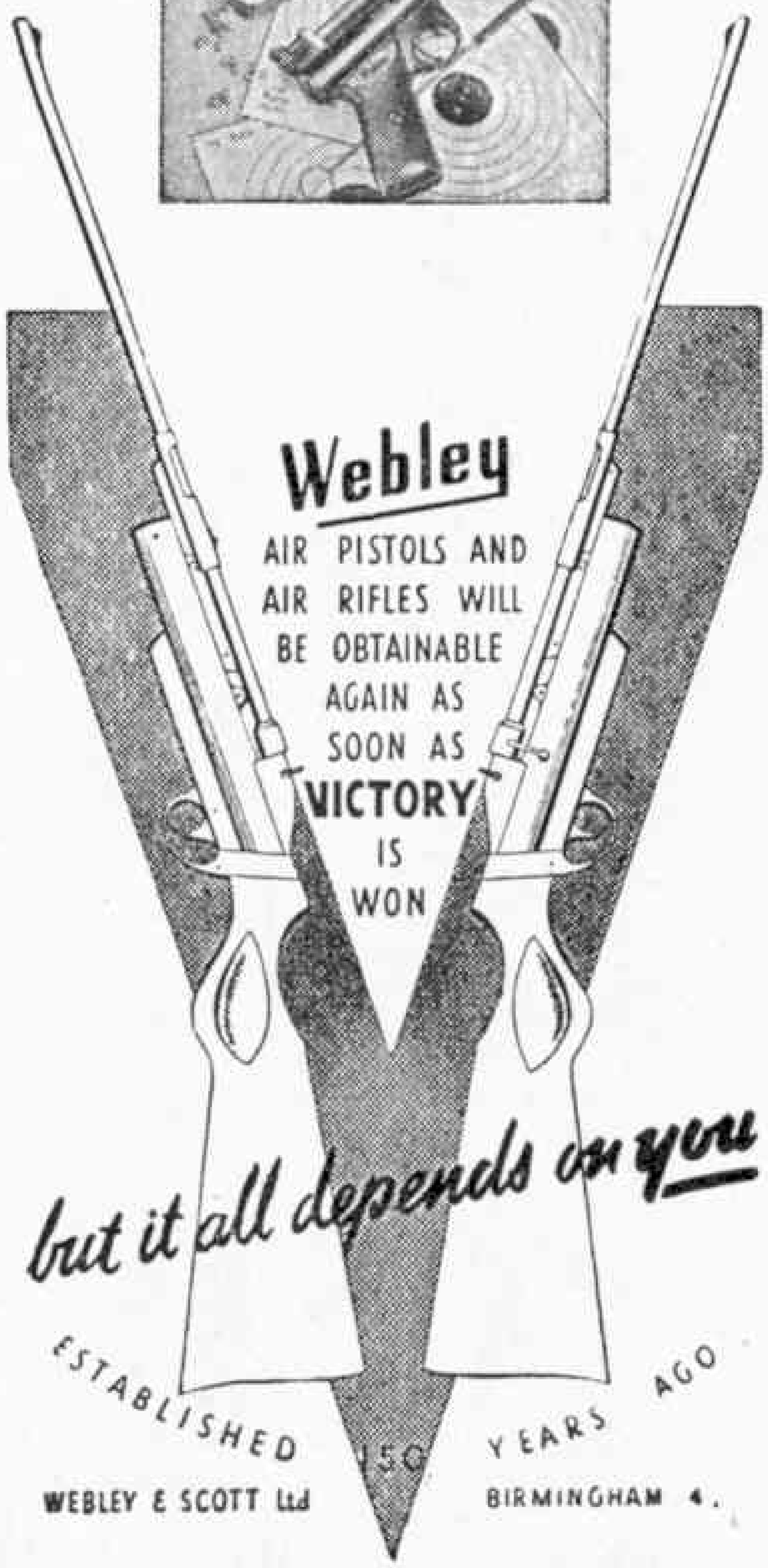

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MECCANO MAGAZINE

Editorial Office:
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Vol. XXVII
No. 9
September 1942

With the Editor

"Puzzle Pictures" Contest

The pile of entries for this contest showed once again that readers are keenly interested in any competition that tests their sharp eyes and good judgment. Picture No. I turned out to be a real poser, none of the competitors identified it correctly. Most of them took it to be a bobbin or reel of some kind; one thought it to be a helical gear and drum, and others said it was a gramophone spring. No. V also proved troublesome. So many competitors identified either five or four of the pictures correctly that it became necessary to select the neatest entries as prize-winners.

The objects shown in the pictures were: I. Stirrup Pump Nozzle; II. Rotor Arm; III. Milk Bottle Top; IV. Micrometer; V. Potato Masher; VI. Rifle Bolt.

The prizes are awarded as follows:

21/–: R. Houseman, 185, Buxton Road, Stockport, Ches.; 17/6: Kenneth S. Cameron, Gamrie Manse, Banffshire, Scotland; 15/–: Ian R. Bowker, 29, Queens Court, Wembley, Middx.; 10/6: A. C. Bishop, 8, Eleanore Crescent, Westlands, Newcastle-under-Lyme, Staffs. Consolation Prizes of 5/–: J. Lisley, 188, Bellingdon Road, Chesham, Bucks.; C. Graves, "Hillside," 12, Pinewood Close, Shirley, Surrey; J. Woodhouse, 8, Burr Street, Dunstable, Beds.

Lieut.-General Dwight D. Eisenhower, Commander-in-Chief of the United States Armed Forces in the European theatre of operations.

Leaders in the War

Lieut.-Gen. D. D. Eisenhower

Lieut.-General Dwight D. Eisenhower was born in Texas in 1891. He graduated from the U.S. Military Academy at West Point in 1915, and during the first world war his work at the Tank Training School, Gettysburg, earned him the D.S.M. He became one of the youngest American Lieut.-Colonels of the war.

In 1935 when General MacArthur went to the Philippines to organise the Philippine Commonwealth Army he took Eisenhower with him as his Chief of Staff. There Eisenhower learnt to fly and was responsible for creating and training the Philippine Air Force. In 1940 he was recalled to the United States to become Chief of Staff of the Third Army. After the bombing of Pearl Harbour he was made Assistant Chief of Staff in the War Plans Division at Washington, and on 24th June of this year he was appointed Commander-in-Chief of the American Armed Forces in the European zone.

Lieut.-Gen. Eisenhower is an outspoken man with tremendous zeal for the task in hand and a dislike of ceremony.

The Royal Marines

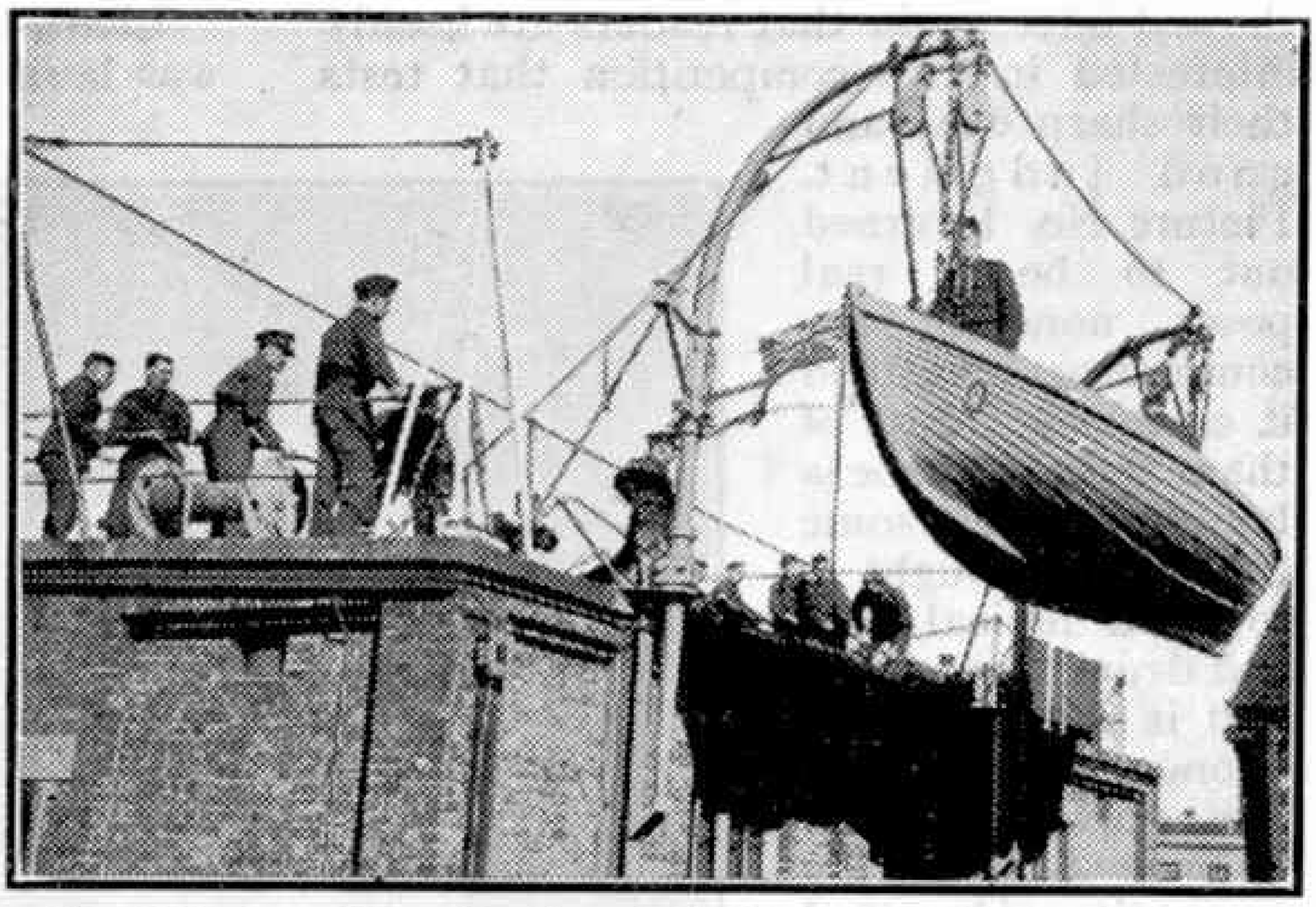
By Captain J. E. A. Whitman

IN all Britain's wars for nearly three centuries the exploits of the Royal Marines have compelled the most honourable notice, and to-day history is repeating itself. Comparatively few people know as much about this famous corps as they do about the Guards, or their own county regiment, and therefore a brief account of the Marines may be of interest.

Prior to 1664 it had been the custom to draft regiments aboard ships of the fleet to act as marksmen, in some cases to aid in the service of the guns—a more simple affair in those days—and to provide landing parties when required. But although Charles II seemed to sit pretty firmly on the throne, there were uneasy under-currents, and to avoid any risk of partisan feeling the Admiralty by a special Order in Council raised its own regiment for this purpose, its strength being fixed at 1,200 men. In 1690 some suspected even this formation of a lingering partiality to King James II, so the raising of a second regiment was authorised; whether this was to watch the first one or not history does not record. The original uniform was yellow and white, with large brimmed hats; but this later gave place to scarlet, and a stiff glazed leather hat with a cockade, which survived until well after Trafalgar.

As was the case with many regiments of the Army, the Marines after each campaign were reduced in strength to a mere nucleus; but after the war of the Austrian Succession, the Duke of Cumberland, realising that the Navy was in a sense almost always on active service, recommended the reconstitution of the Marines as a permanent military body under Admiralty control. In 1755 a Warrant authorised an establishment of 50 companies with headquarters at Chatham, Portsmouth and Plymouth. Thirty were added before the end of the year, 20 more in July 1756, 30 in March 1757; and in 1759 the strength of each company was increased by one lieutenant, one corporal, one drummer and 23 privates.

The first service of the Marines was with the fleet with which the Duke of York opposed the Dutch in 1665, and their conduct was outstanding; 1672 saw them facing the same foes with equal valour. But the years 1704-5 gave the Marines the only battle honour that is mounted on their colours—"Gibraltar." In July 1704 Sir George Rooke led an expedition against this already famous fortress, and after a furious bombardment lasting six hours, landed seamen and marines, as well as troops of three Line regiments, to carry it by storm. In spite of heavy casualties caused by the Spanish mines, this was done and the garrison marched out with the honours of war.

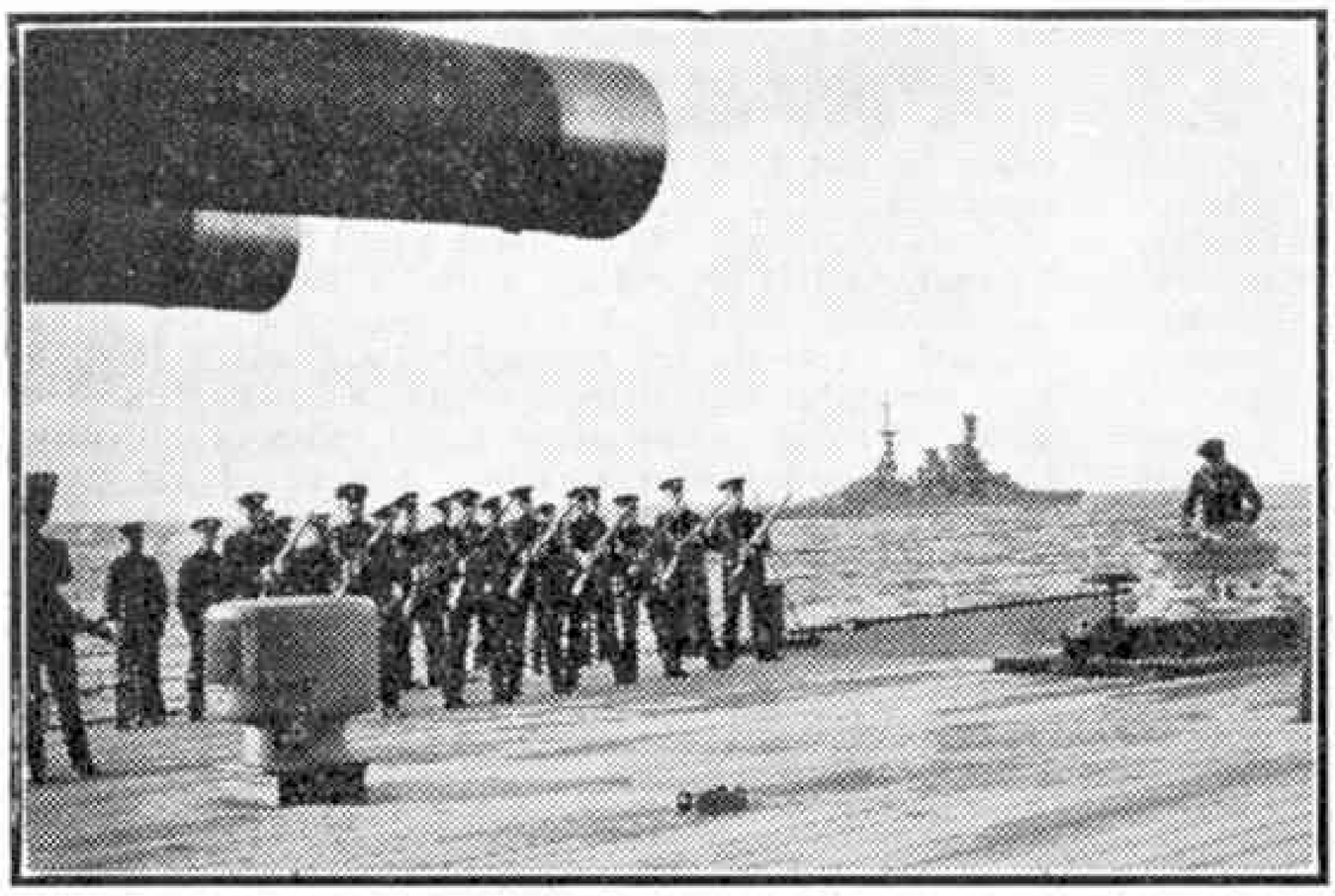


Royal Marines "launching" a whaler from a roof during training.

Since that 24th July no flag but the Union Jack has waved over Gibraltar, but it has often been assailed. Determined attempts at its recapture were begun almost at once and continued into the following year and on 11th January a very strong force of French and Spanish penetrated the works. The Marines, under Colonel Jacob Bort, defended the Round Tower with obstinate gallantry, and being presently aided by the Coldstream Guards, drove the attackers back in confusion.

The Marines were at Dettingen, 1742—the last battle on which an English King appeared in person on the field; and at Pondicherry, 1747. But the taking of Belle Isle in 1761 has a particular interest for the corps. The first landing, although

it promised well, could not be sustained, the point selected for attack being excessively rocky and the defences surmounting



Rifle drill on a battleship.

it too strong. But in a second attack on 22nd April Brigadier Lambert led his Marines and Grenadiers against Fort D'Arcy, effected a landing and drove in the first defenders. Covered by a heavy fire from the ships, reinforcements rapidly followed and a secure lodgment was made. A siege followed. On 13th May the Marines stormed at the point of the bayonet six redoubts which guarded the approach to the town of Palais, inflicting such heavy loss that the enemy broke and fled in confusion through the streets. A desperate defence continued in the citadel until at last, on 7th June, the Chevalier de St. Croix capitulated.

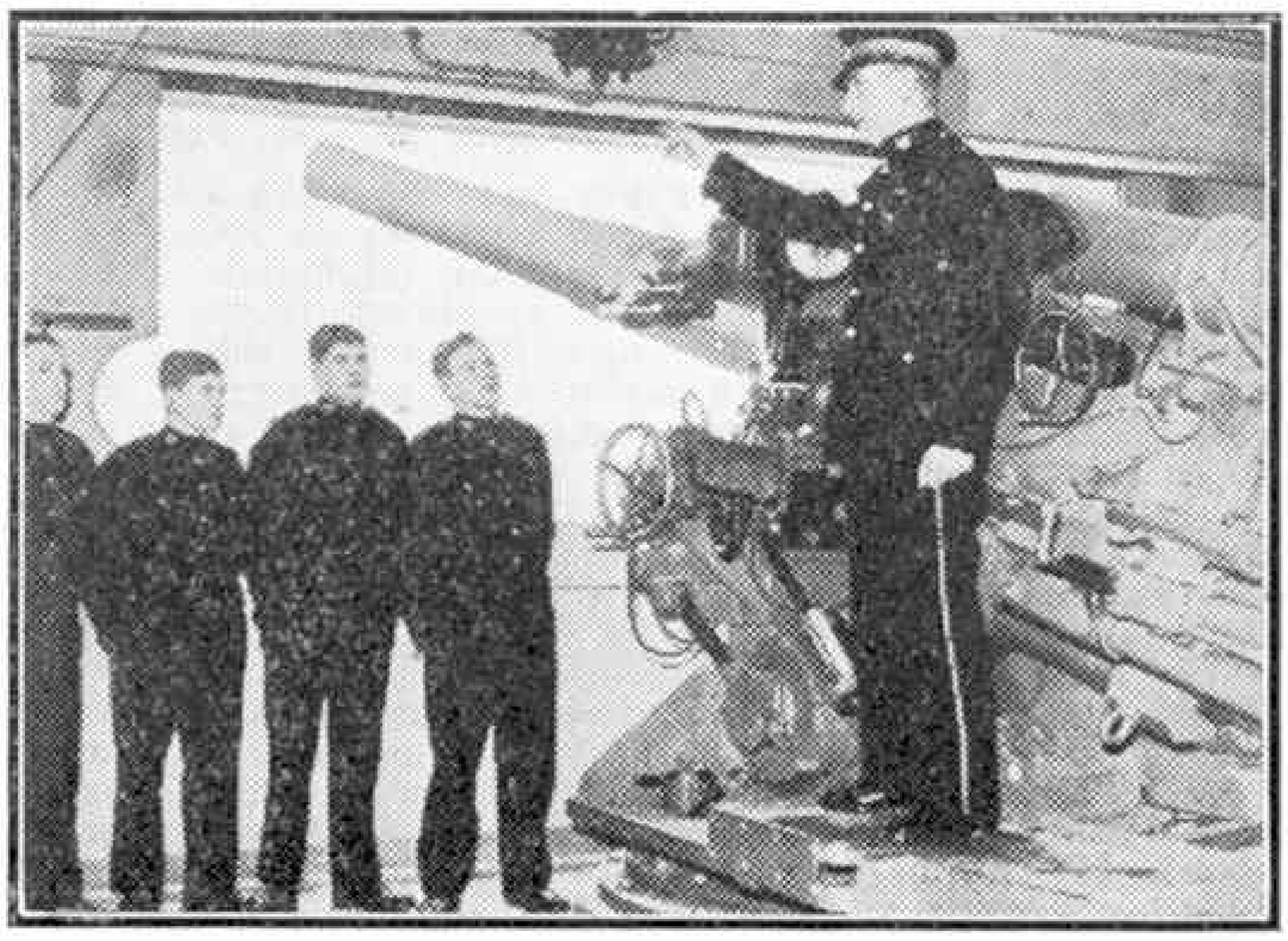
This was one of Britain's "sideshows" that did not go wrong; and for their fine conduct the Marines were granted the laurel wreath that forms part of their badge to this day.

And so the tale continues throughout the many wars since that time. In every great sea fight—and many a ship-to-ship engagement—the Marines were well to the fore; from very early days they manned a proportion of the ship's guns, while others acted as sharpshooters and boarders. Ashore, they are mentioned in the Peninsular annals, notably at Barrosa and in manning the lines of Torres Vedras. And Marines formed part of the garrison guard at St. Helena in the last days of the fallen Emperor.

During certain years, notably 1796-7, many abuses long overdue for attention caused justifiable dissatisfaction in the Fleet, and in many instances the conduct of the seamen was decidedly undisciplined. In several of these incidents the officers were saved from violence by the Marines; and since that time it has been the custom for the Marines to be quartered next the officers, when afloat. They find the officers' servants; and, under the orders of the Master at Arms, act as the ship's police.

In 1805 there was so many calls on the Marines for gunnery duty that the Royal Marine Artillery was separately constituted. It wore the artillery blue, the rest retaining the scarlet. The other wing was named Royal Marine Light Infantry after the Crimea in recognition of its services there; but the two wings were reunited in 1923. In 1827 King George IV ordered the Globe to appear with the laurel wreath badge, indicating the wide range of their services. The anchor shows the control by the Admiralty, while the motto, "*Per mare, per terram,*" "By sea, by land," is surely the most appropriate that could have been chosen.

The Ridge at Balaclava; the relief of Lucknow; Egypt, and the Soudan expeditions which sought to succour Gordon;



Royal Marines receiving Naval Gun training.

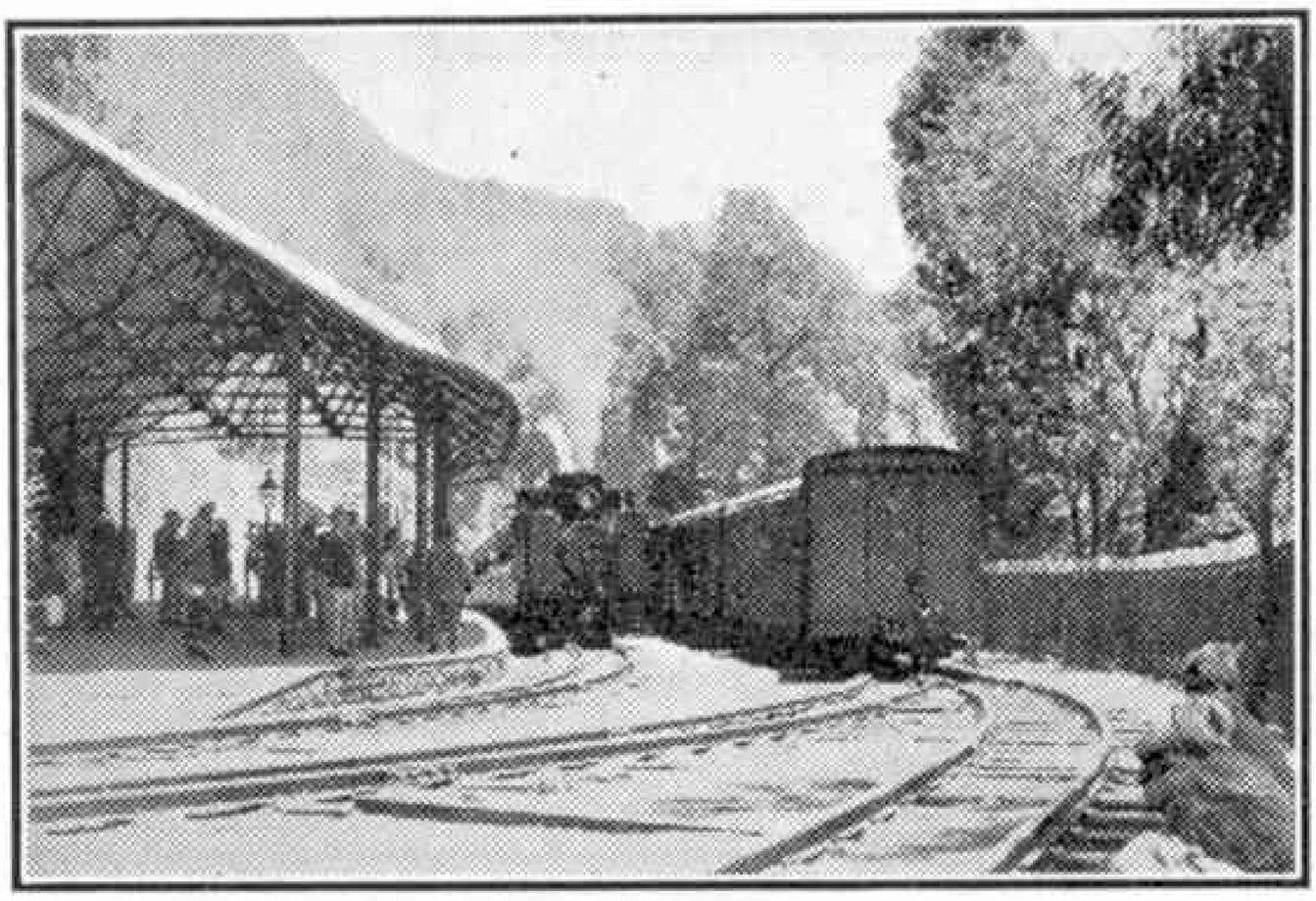
South Africa, striving towards Ladysmith with Buller and towards Kimberley with Methuen; while in the same year 75 gallant Marines held the legation at Peking against fanatical Chinese rebels—such are a few of the high spots of their career during the nineteenth century. (*Continued on page 338*)

Railway Working in India—II

By O. S. Nock, B.Sc., A.M.I.Mech.E.

WITH the exception of the suburban areas of Calcutta, Bombay, and certain other large cities, almost all Indian lines, whether main or branch, are single-tracked. For many years after the building of railways signalling was practically non-existent, but with the growth of traffic, and increased speeds, it became necessary to install apparatus for the safe-guarding of train movements. At large centres English practice was naturally adopted, but at the numerous wayside stations, each of which constituted a passing loop, full-scale mechanical interlocking was not justified. Furthermore, with the necessity for using native labour, apparatus had to be as far as possible proof against misuse, and such that the stationmaster, or some other fully responsible officer, could at all times exercise direct supervision over the working of the entire layout.

A typical passing station would have three tracks—main line, down loop, and up loop, and the loops would be about 1,000 yards long. At the station, under the direct control of the stationmaster, there is a ground frame for working the signals at each end of the loops, but the points are worked by individual hand levers mounted near to the actual switches. These hand levers cannot be moved at will; they are key-locked and cannot be released until authority is given by the station master. In his office there is an interlocking key box, and when a train is approaching, destined, for example, for the up loop line, the stationmaster selects the appropriate key from the box and inserts it in an electric transmitting instrument. The turning of the key in this instrument sends current to a corresponding instrument near to the points, and this enables the pointsman to extract the necessary key to unlock the points lever. When the points are correctly set the stationmaster can pull off the appropriate signal. Although this sounds a rather complicated procedure it has been found specially suitable for Indian conditions.



Sunny Hill Station on the Kalka-Simla mountain line, North Western Railway. Photograph by W. Stokes.

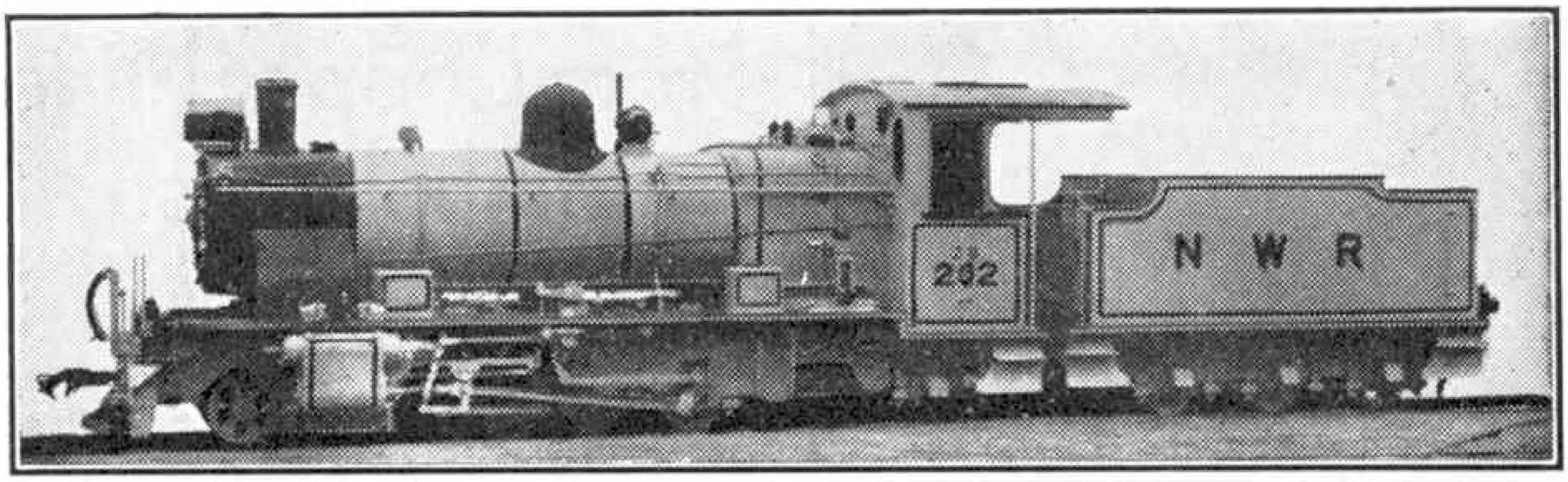
The ordinary single-line absolute block system is in use on most Indian lines, though here again a special form of staff instrument has been designed in which the token is a ball, instead of the usual tablet or train-staff used in this country. Experience showed that it was very necessary to render such instruments "burglar proof," as in early days more than one accident was caused through the deliberate tampering with the apparatus. In recent years a new type of single-line block instrument has been introduced; though working on exactly the same principles as that using the ball tokens, this new variety uses tablets.

At the larger stations some very fine mechanical interlockings are to be seen. The yards are spacious, and well laid out, and everywhere one sees the characteristically British lower-quadrant semaphore signals. At some of the terminal stations in Bombay and Calcutta complete power signalling with colour-light signals has been installed.

Passing now from the great trunk routes to some of the lesser, though equally interesting lines, we come to the native state of Hyderabad, in the very centre of India. This is the foremost of all the native states; it covers an area about equal to that of Great Britain, and is served by a comprehensive transport organisation under the direct control of the Nizam himself. It bears the title of "His Exalted Highness the Nizam's Guaranteed State Railway," and in addition to operating some 1,350 miles of railway it includes road motor services, a fleet of air liners, and a thriving railway hotel business. The state of Hyderabad does indeed provide a most interesting example of the efficient co-ordination of all forms of transport, where conveyance by elephant, bullock cart, camel, or human carrier forms a feeder system to one or other of the modern mechanical means. About half the railway mileage of 1,350 is laid on the broad gauge, and on these lines some fine modern locomotives are at work. Lately several of the Railway Board's standard designs have been adopted, including some "XD" class 2-8-2 mixed traffic engines, which have a tractive effort of 35,260 lb. The boiler and fire-box is about the same as that fitted to the "intermediate" "Pacifics" of Class "XB," but the Nizam's 2-8-2 engines have the additional refinement of mechanical stokers, and a booster operating on the trailing wheels.

A sub-standard gauge line, of great importance just now owing to its proximity to the Burmese frontier, is the Assam Bengal, which runs northward from the port of Chittagong. It is of more recent construction than most of the Indian railways, work having been started in 1891. Although a wealth of experience was then available on the building of railways in tropical countries, the hill section of the Assam Bengal line, running for 112 miles through an unhealthy inhospitable country, taxed engineering skill and resource to the utmost. Of the 25,000 men engaged on the work nearly every one had to be brought from other Indian provinces; and the organisation, transport and feeding of this force had to be arranged for in a country where the "roads" were mere tracks, impassable after heavy rain even for bullocks. One young engineer, who travelled out from England, took four months to journey from Calcutta to his assigned post. On certain stages his party had to hack their way through jungle on a compass bearing, and his progress was not assisted by the attentions of an elephant which killed two of his ponies and did a lot of damage to his camp. The hill section of the line took in all 11 years to build, and the complete route was opened for traffic in 1904, by Lord Curzon, who was then Viceroy of India.

For metre gauge lines, such as the Assam Bengal, the Railway Board has standardised "Pacific" engines for passenger traffic, and 2-8-2s and 2-6-0s for goods. The "Pacifics" are almost as powerful as the 5 ft. 6 in.



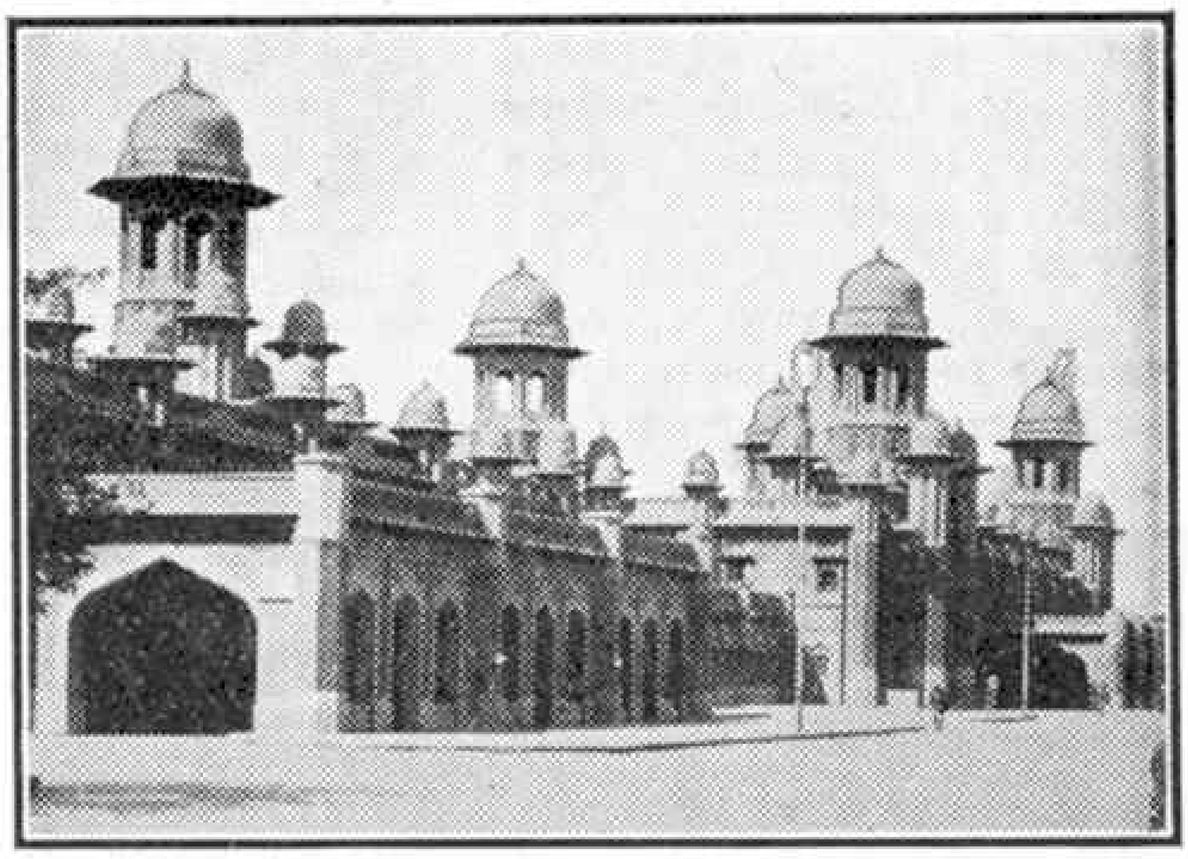
2 ft. 6 in. gauge standard 2-6-2 locomotive for the North Western Railway. Photograph by courtesy of W. G. Bagnall Ltd., Stafford.

gauge "XA" branch engines, described in the first instalment of this article, since they have a tractive effort of 19,729 lb.; but they are not intended for high speed, and this power is partly attributable to the smallness of their driving wheels, 4 ft. 9 in. diameter. But for really small wheels we must come to the standard 2–6–2 locomotives running on the 2 ft. 6 in. gauge lines of the North Western and B.B.C.I. Railways. These interesting engines, one of which is illustrated on this page, have coupled wheels only 2 ft. 10 in. diameter. The cylinders are 12 in. in diameter by 18 in. stroke; the adhesion weight, divided between three axles, is only 17.8 tons; but it is perhaps the modest grate area of only 14 sq. ft.—against the 51 sq. ft. of the "XC" Pacifics—that gives the most vivid impression of the diminutive size of these engines.

In striking contrast to these pigmies is a giant Mallet compound 2–6+6–2 that has been working experimentally on the broad gauge lines of the North Western railway for some years past. This engine weighs 122 tons without its tender, and has a tractive effort of 52,600 lb. For some time this articulated compound locomotive was running in comparative trials against a Beyer-Garratt of the 2–6–2+2–6–2 wheel arrangement, and having an approximately equal tractive effort. The tests were carried out on the very heavy road leading to the North West Frontier, where in the Bolan pass the gradient is 1 in 25. Still more forbidding, in the stark barrenness of the scene, is the line through the Khyber Pass; here the "stations" are just passing loops, with a single building like a fort lying some way back from the line. While the train is toiling up a seemingly endless gradient of 1 in 33, one looks out on villages of the Afridi tribes, on ravines that are waterless in the dry season, to see native caravan tracks crossing the railway, and at one place an ancient Buddhist tope, 2,000 years old, standing on a spur of rock. For working this line the North Western Railway uses principally the powerful "HG" class 2–8–0 locomotives, having a tractive effort of 30,000 lb.

Altogether contrasting to both the scenery and operating conditions on the North West Frontier lines are the narrow gauge railways leading to the hill stations of Simla and Darjeeling. The latter, in about 40 miles, climbs from the plains to an altitude of over 7,000 ft., on a gradient averaging about 1 in 30. The inclines would be even more severe, but for the frequent use of reversing stations—miniature editions of the giant zig-zags on the main line of the G.I.P.R. through the Western Ghats—and some spectacular spiral loops. These latter are laid out on the same principle as the spiral tunnels of the Alps and the Canadian Rockies, but as the Darjeeling trains are hauled by small tank engines, and consist of quite small carriages, the curves are very sharp and the complete spiral is constructed on the surface. Providing the day is clear of mist, the journey from Siliguri, where connection is made with the Eastern Bengal Railway, can be a most exhilarating experience; the slow climb through the forests of the Himalayan foothills gives ample opportunity for seeing the strange and beautiful vegetation, while there are many wide vistas where the plains are seen spread out beneath, and closer at hand are the snow-capped giants of the Everest range.

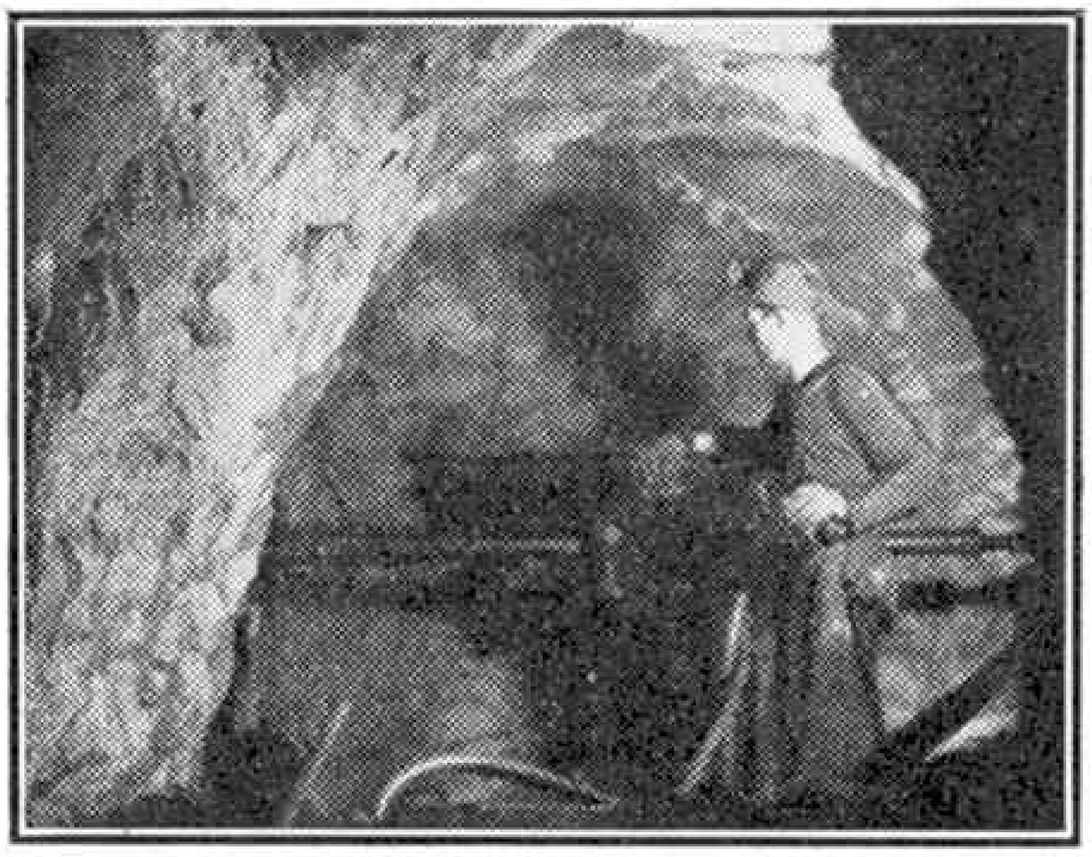
The line from Kalka to Simla, in the Punjab, is built in the same style, but though the gradients are equally steep, the worst being 1 in 25, the curves are not so sharp. On this line some interesting locomotives, articulated on the Kitson-Meyer principle, are at work. This type of engine is not unlike a Beyer-Garratt except that the forward engine unit is under the smoke-box and first ring of the boiler, instead of being out in front and leaving the boiler slung between the two engine units. These engine units act as bogies, the boiler and superstructure being carried on two pivots located at approximately the centre of the adhesive wheelbase of each bogie. This form of construction provides very easy running on a sharply curved mountain line. These particular engines, which are of the 2–6–2+2–6–2 wheel arrangement, were designed to haul a load of 160 tons up



Exterior of Cawnpore Station, East Indian Railway. Photograph by W. Stokes.

the 1 in 25 gradients at a speed of 10 m.p.h. The four cylinders are 13½ in. diameter by 14 in. stroke; the coupled wheels are 2 ft. 6 in. diameter.

Thus it will be seen that railway travel in India provides one long succession of vivid contrasts. As if to compensate for the brown waterless landscape of the plains, and the occasional clusters of mud huts that pass for villages, the railway coolies seem always to sport the most brilliant colours in their scanty apparel, and a journey can be enlivened by an occasional procession of brightly clad women along the lineside, each carrying a jar or bundle on her head.



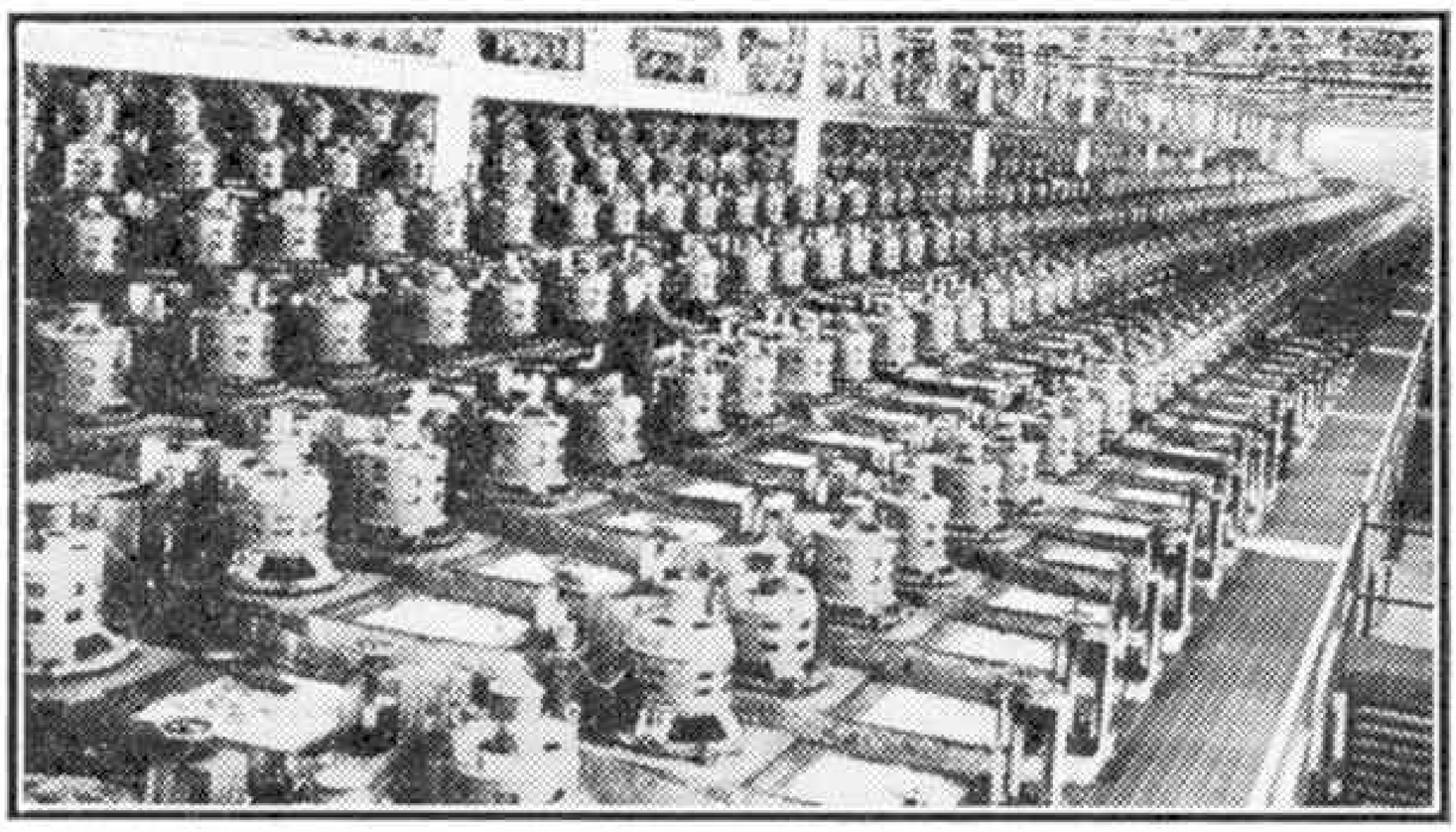
Copper ore is mined by drilling and blasting. Our illustrations are from the Copper and Brass Research Association, New York, through the courtesy of the British American Metals Co. Ltd.

From Copper Mine to Shell Case

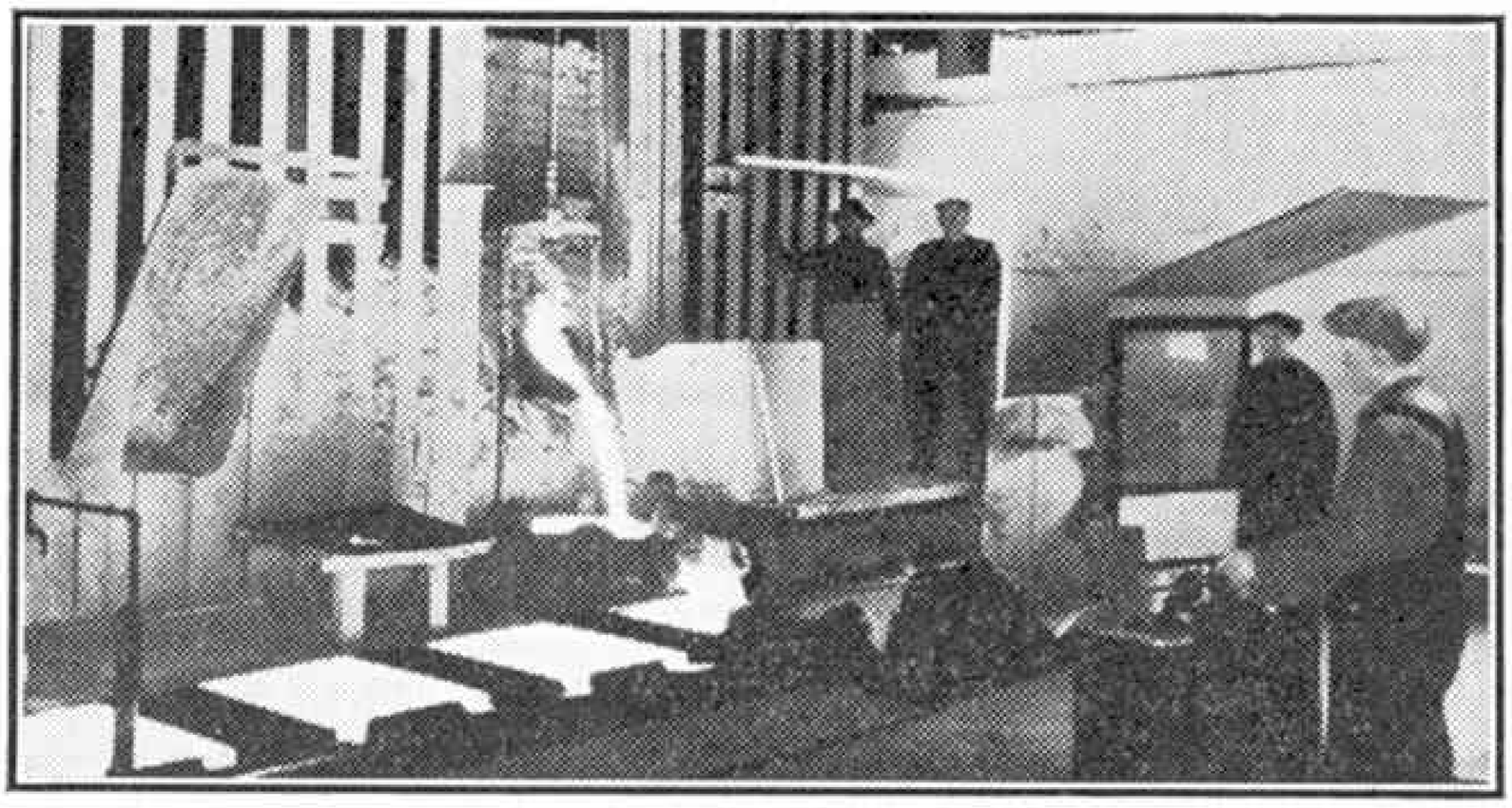
A Note from America

THIS war, which has engulfed such a large part of the world and which threatens the rest of it, has been aptly called a War of Metals. This description is based on the estimate that for each soldier in the field modern mechanised armies employ two tons of metal of all kinds for tanks and other equipment. In comparison, during the first World War between 100 and 200 lb. of metal per soldier was sufficient. Among the metals utilised by armed forces to-day, copper and its alloys play a prominent role. For instance, a certain type of bomber requires more than two miles of copper wire alone, in addition to many other copper and copper alloy parts. Some bombers utilise as much as 500 lb. of copper and its alloys, while the average battleship requires in the neighbourhood of 2,000,000 lb. of the red metal. Together with many other strategic materials and resources, copper and its alloys—man's most useful metals—have been called to the colours.

In view of this increasing consumption of copper and its alloys, it will be of interest to consider the factors that are involved in the conversion of copper ore, by smelting methods, into metals for modern armaments, including brass cartridge cases.

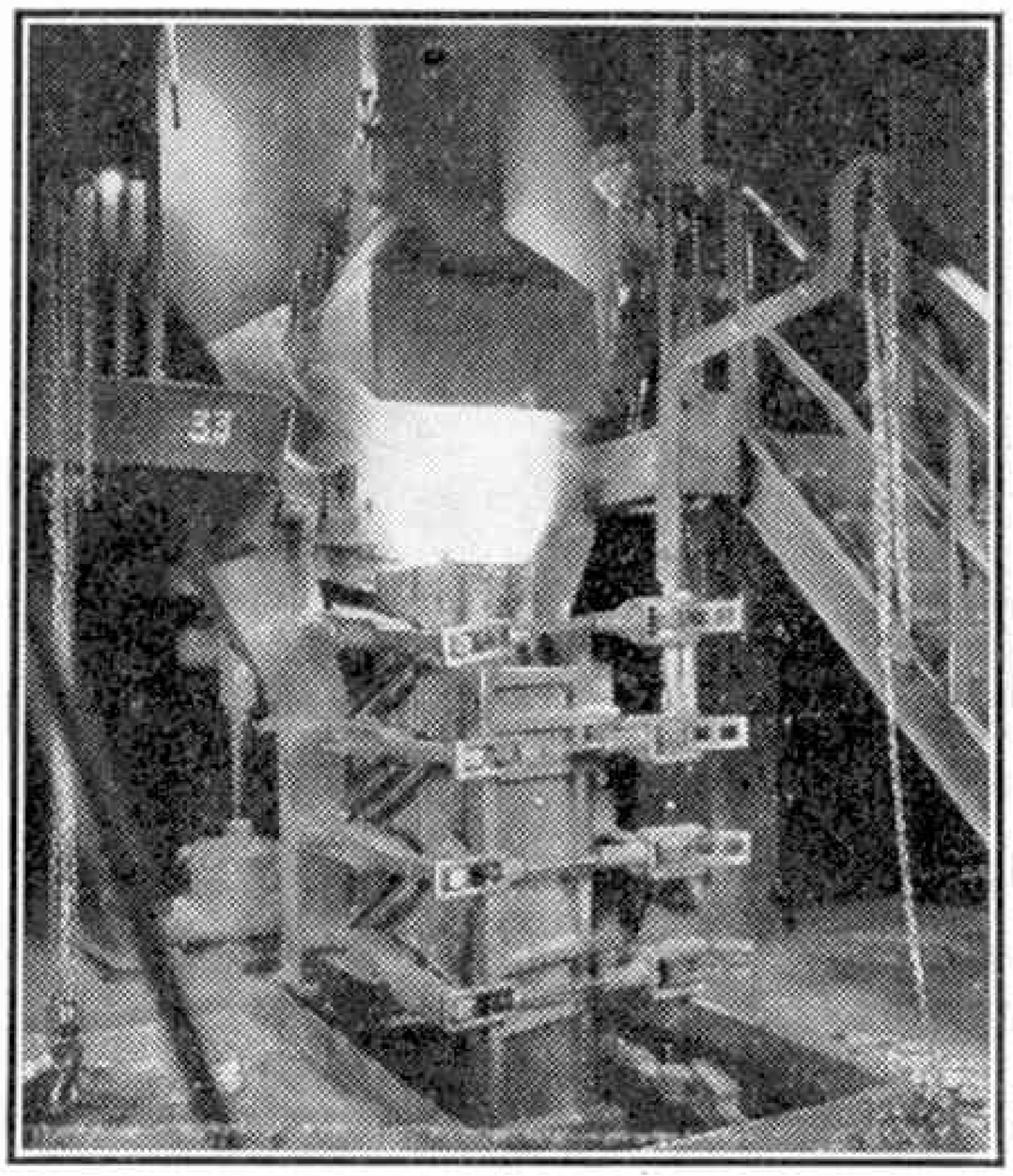


Flotation plant where copper ore, ground to fine particles, is mixed with oil and chemicals and agitated to form a froth of bubbles, which are skimmed, carrying the metal particles.



Anodes, weighing five to six hundred pounds each, are cast as they leave the converter at the smelter or at the electrolytic refining plant.

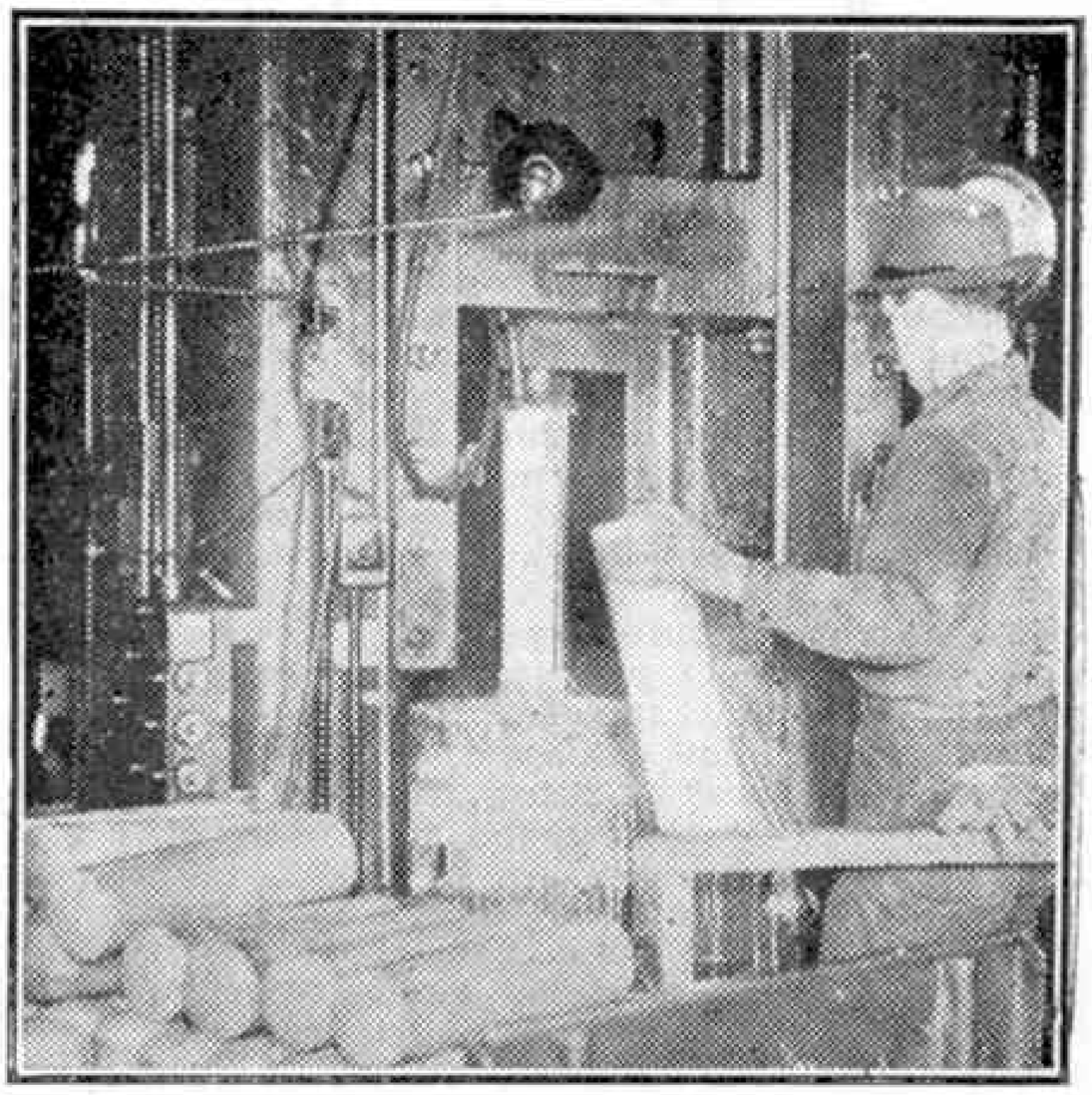
Few people realise the complexity and magnitude of operations of the copper industry and the length of time required to produce a brass shell case from ore dug out of the earth. Most ores are combinations of rock and various minerals, and must be treated in various ways to recover the copper most efficiently. The



Pouring charge of cartridge brass into moulds provides an inspiring display of colour.

ores are crushed and concentrated mechanically or by a chemical flotation process. Broadly speaking this is the same process as that employed by prospectors who "panned" streams for gold. The "concentrates" are now roasted to eliminate excess sulphur, and the resulting "calcines" are transferred to reverberatory furnaces where the waste materials and more of the sulphur are removed. The product, called "matte," is poured into a converter, where the iron and the remainder of the sulphur are eliminated by oxidation. This results in "blister copper," which may be further furnace refined or sent to an electrolytic refining plant.

When blister copper enters a refinery it is melted and cast into anodes which are placed into electrolytic tanks. Here the copper is transferred and deposited on the cathodes, practically all impurities being eliminated. The copper is now 99.98 per cent. pure, and is sent to the fabricating plant to be used in making shell cases. In normal conditions it has taken three months for the conversion of copper ore into copper cathodes, and has utilised equipment and transportation facilities costing millions of dollars.

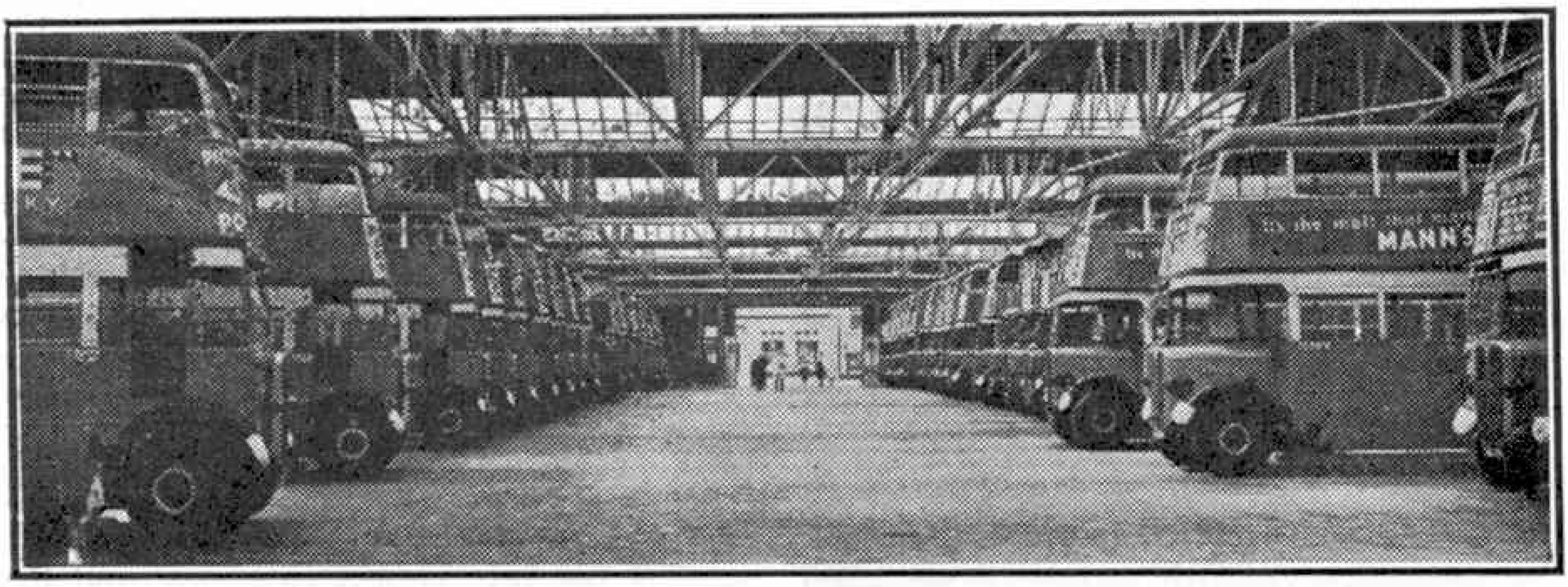


The last of four redrawing operations on brass shell cases. In each step the cylinder has been lengthened and the wall thickness correspondingly reduced.

Inspectors representing both the manufacturer and the Government check 90 mm. brass shell cases.

Brass shell cases are made from an alloy known as cartridge brass, consisting of 70 per cent. copper and 30 per cent. zinc. Cathode copper and zinc are charged into a melting furnace and after about an hour brass slabs are cast, generally three or four at a time. These slabs are now given several "passes" through rolls that reduce them to strips of the desired thickness. From this strip metal discs are stamped or blanked. "Cupping" is done in a powerful hydraulic press that draws the discs into shape something like a teacup, except that they are much heavier and larger.

After successive redrawing and annealing operations, the shell case assumes its ultimate diameter, length and wall thickness. Several machining operations finish the bottom and taper the neck of the case.



Buses in the L.P.T.B. Central London garage ready for service.

A Central London Bus Garage

By T. R. Robinson

THE London Passenger Transport Board have recently brought into operation an interesting omnibus service station, situated, not in the suburbs as is customary, but nearer the central area. There is a special reason for this. During the morning and evening rush hours, caused by shoppers visiting Central London, increased services are necessary. Formerly buses that were added to the normal services carried their passengers to Central London, returned empty to their suburban garages, and then had to make further empty journeys to the central area to pick up rush-hour travellers. Garages nearer the central district allow the extra vehicles to be stored between rush hours at points from which they can quickly return to their routes just where they are most needed.

The site measures about 37,000 sq. ft., and the ground floor of the building is about 350 ft. long and 128 ft. wide, providing ample accommodation for 100 buses. Below ground is a basement measuring 230 ft. by 120 ft., designed to house 70 coaches of the type used for private hire work. Entry to the basement is by ramps from the ground floor.

Located on the ground floor space, and inside the main entrance doors, are two islands used for re-filling the tanks of buses with fuel oil or petrol. Three lines of vehicles can be serviced at the same time. The fuel oil and petrol are stored in underground tanks, and pumped to the filler nozzles on the islands by power pumping units, each pump being driven by a 3 h.p. motor. As each bus draws level with the filling island, the filler nozzle for petrol or fuel oil is inserted and the supply turned on. The nozzles are of the automatic cut-off type, and as soon as the tank is filled the supply ceases. The device used for this is very ingenious. Beside the filler pipe is a small air pipe that ends close to the filler nozzle. Air from a low-pressure supply is fed down this pipe, and allowed to escape at the end near the filler nozzle during the filling operation. As long as this escape of air goes on the filling continues; but as soon as the rising level of the fuel in the bus tank covers the end of the air pipe, the air flow is restricted and a trip valve cuts off the fuel supply. In this way each bus receives the full quantity of fuel necessary, irrespective of the amount already in the tank.

While the filling is going on, oiling and greasing are carried out. The lubricating oil is pumped at a pressure of 100 lb. per sq. in. and passes along overhead pipes to drop hoses on the islands. These hoses have special metering nozzles that measure the quantity of lubricant supplied, and are capable of delivering six gallons of oil per minute. Greasing is by pressure supply operated by compressed air at 200 lb. per sq. in.

In addition to all this, three pairs of vacuum cleaning points are provided on the islands for cleaning the bus floors and upholstery.

There is a full installation of fume extractors to prevent serious pollution of the air.

Beyond the garage floor space is the section that deals with adjustments and repairs, and here as elsewhere the equipment is of the most modern type. One interesting machine that deserves mention is the Bradbury brake shoe relining machine. This machine, with the aid of jigs and tools, forces out the old rivets and strips off the old linings from the brake shoes. Then it attaches new linings, rivets them in place, and finally grinds off the faces of the linings to the correct contour to provide the maximum grip on the brake-drum. The operations are so controlled that it is impossible for an (*Continued on page 338*)

Buses over the inspection pits. Photographs by courtesy of the London Passenger Transport Board.

The Civil Air Ensign

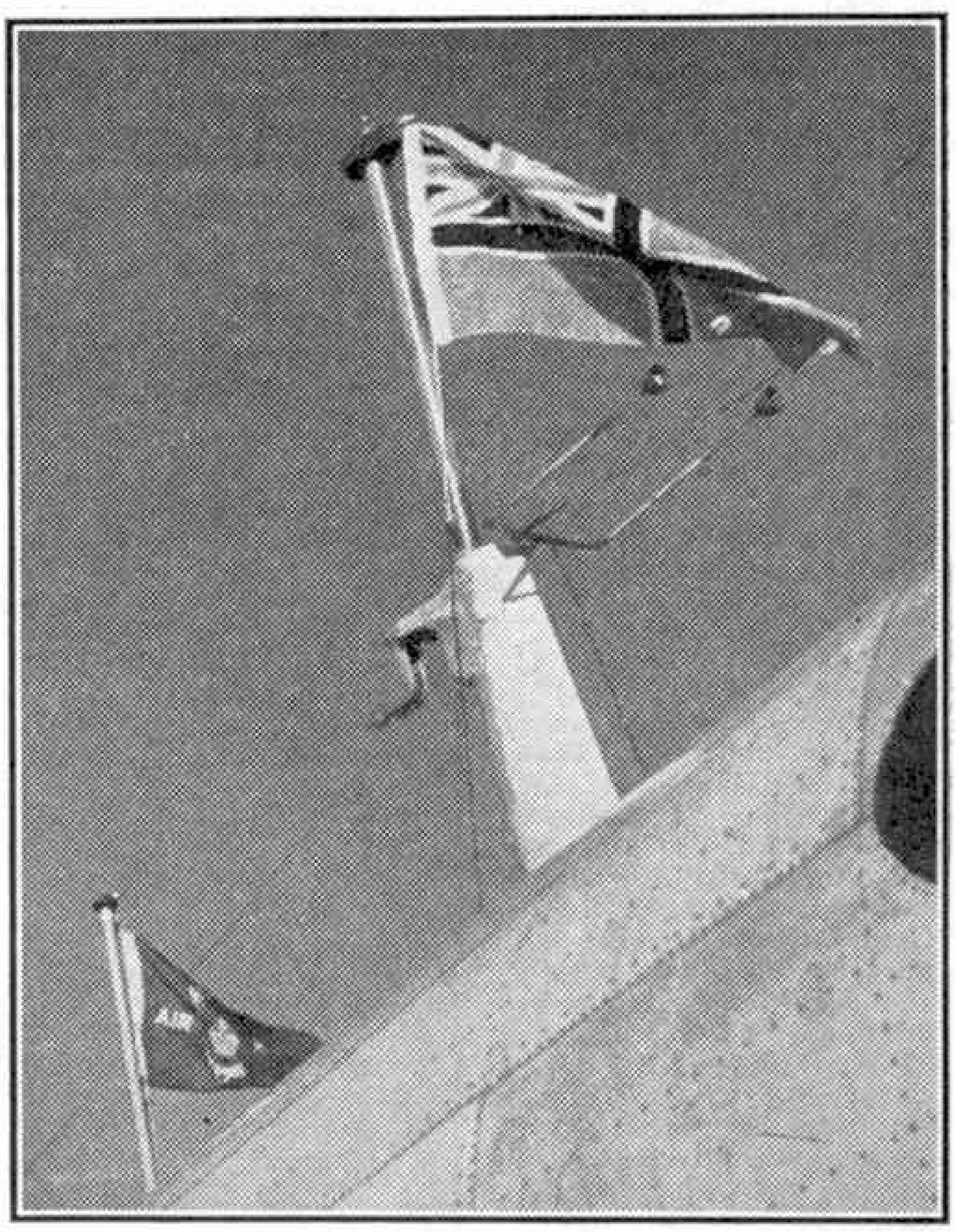
HOW many people would know the Civil Air Ensign if they saw it? It is the flag of the Merchant Air Service, and corresponds to the Red Ensign of the Merchant Navy. It is sky-blue, with a dark blue cross, edged with white, and has the Union Jack in the top left-hand corner.

Just as in the case of ships, there is a rigid etiquette governing the use of flags on civil aircraft. In fact in some respects it is not a matter of etiquette, but of international regulations. The Sky-Blue Ensign is flown by all British civil aircraft on touching down, and is also hoisted before passengers are embarked until take-off. At these times also it is the practice for air liners arriving at or departing from foreign ports to fly as a matter of courtesy the national flag of the country in which the port is situated. British aircraft carrying mails fly a Royal Mail pennant.

The aircraft of the British Overseas Airways Corporation, which represents the Merchant Air Service, visit many foreign ports, and, particularly since it is a Government-owned concern, the company has its own regulations to ensure that international flag etiquette is strictly observed.

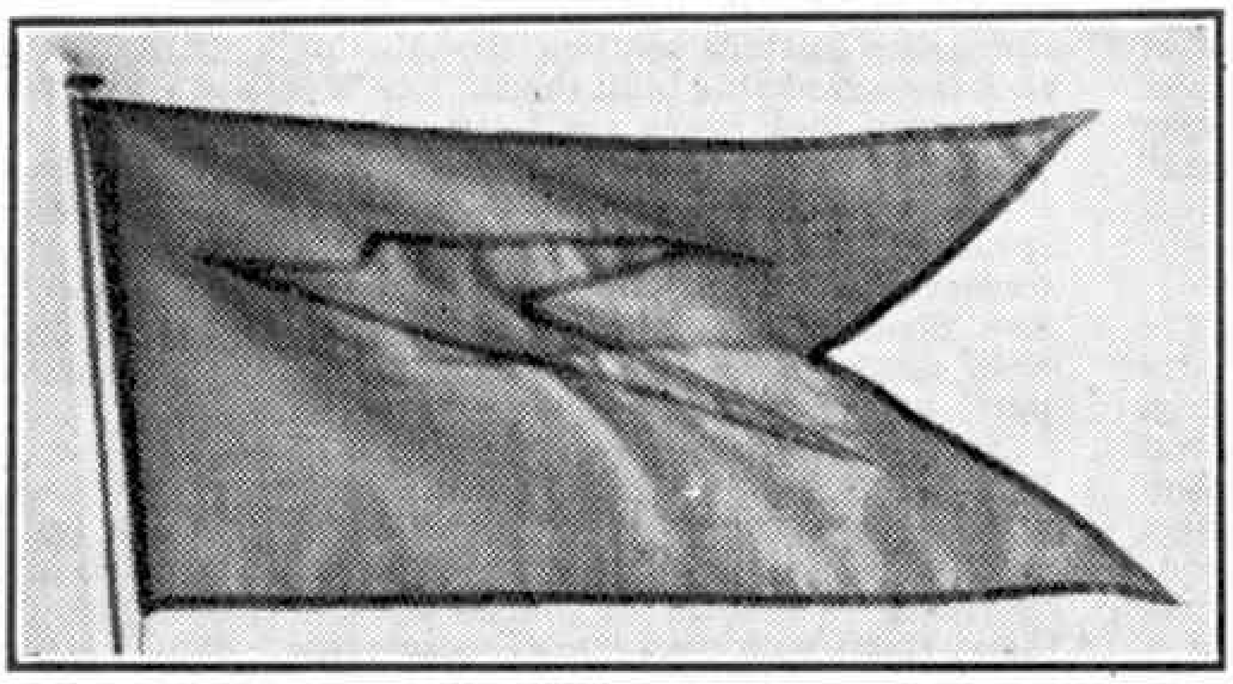
Thus British Airways aircraft fall into line with British ships and official establishments abroad by flying the national flag of the country visited; on such occasions as national festivals flying boats also "dress ship" when warships do so. This is done by flying a line of flags extending from the bow of the aircraft, over the fixed wireless mast amidships, to a suitable point aft, generally the tail fin.

A British flying boat, under maritime law, is an ocean-going craft and therefore must carry a full set of signal flags of the International Code, as well as the Civil Air Ensign.



The Civil Air Ensign and the Royal Mail Pennant flying from a British Airways Aircraft. Photographs by courtesy of British Overseas Airways Corporation.

To facilitate recognition of its offices and establishments, especially overseas, British Airways has now adopted a House Flag. It is patterned on the nautical burgee, and incorporates the Corporation's "Speed Bird" insignia, worked in gold on a background of Imperial blue, the burgee having a gold border. This House Flag will be seen in the United States, across Africa from the Atlantic seaboard to the Sudan, from Durban up to Cairo, and in India, Iran, Iraq, Palestine, Arabia, and other countries as well. No doubt it will become as famous as the flags of the Cunard-White Star, P. & O., and other great shipping lines.



British Airways House Flag.

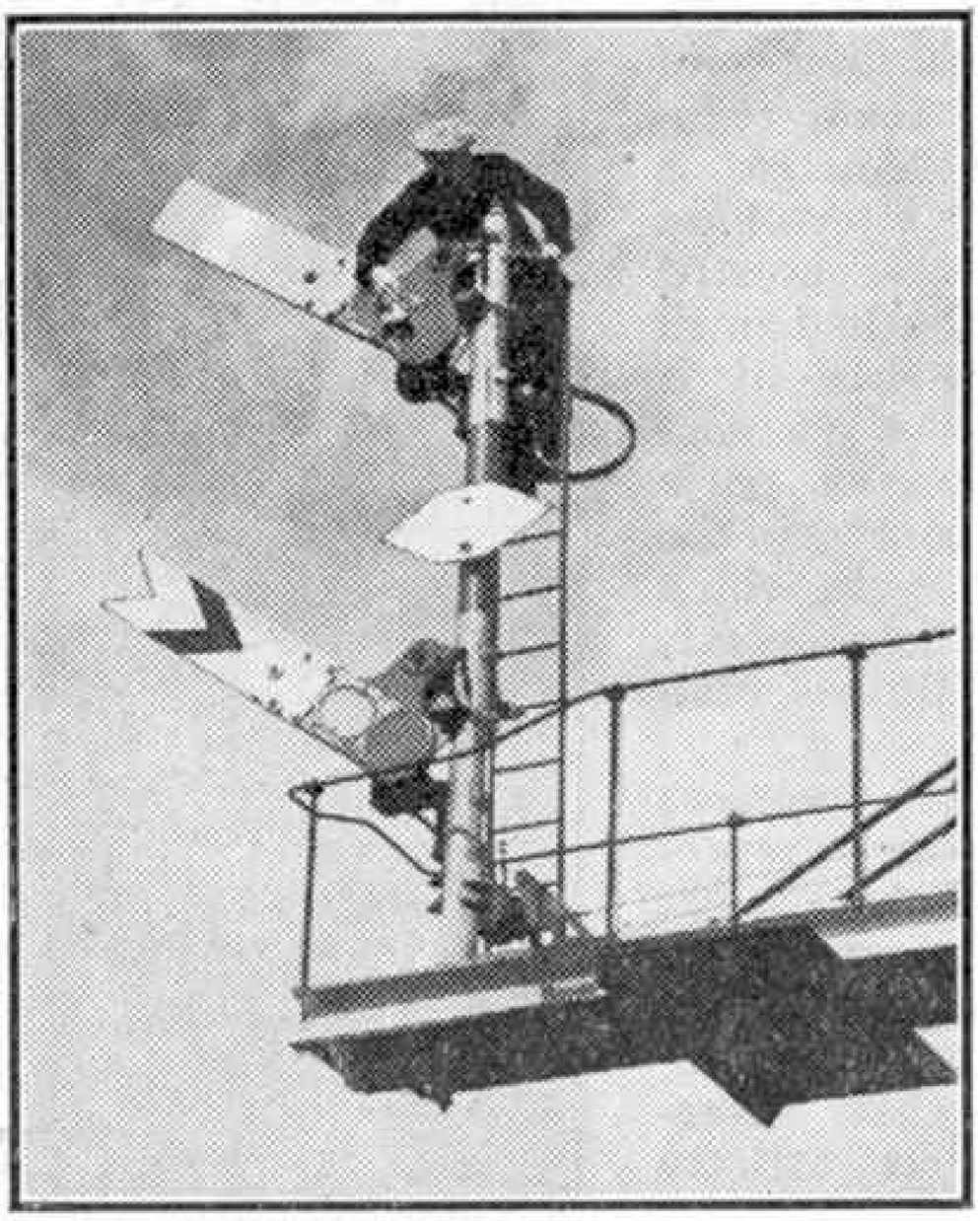
Railway News

Double-heading, Old and New

On the former Great Northern Railway, now part of the L.N.E.R., there was a strict rule from 1902 to 1918 that "Atlantics" were not to be assisted whatever the load, and that except in some exceptional emergency no other engine was to be attached to a 4-4-2 when working a train. As a matter of fact, after there were sufficient "Atlantics" to take over all the principal express duties it was most unusual to see a double-headed train of any kind on the Great Northern, particularly in the London area. For a year or two before the outbreak of war in 1914, and with the subsequent reductions in service, however, one down express, the 5.0 p.m. from King's Cross, was regularly double-headed, Mondays to Fridays, as far as the first stop at Hitchin.

At Hitchin the train was split into three separate portions. The first went fast to Cambridge, worked by a King's Cross 4-4-0, which had been train engine and was a superheated "D1" numbered between 59 and 62, now 3059-62. The centre section went to Peterborough, Essendine and Stamford, providing a long-disappeared through service to that town from King's Cross; it was in charge of a Hitchin "D2" 4-4-0 which, after handing the train over to the branch 4-4-2T at Essendine, went light engine to Grantham and returned as far as Hitchin with quite a heavy express perishable goods train. The leading engine from London, generally a rebuilt Stirling 2-4-0 stationed at Cambridge, after temporarily running out of the way, backed on to the remaining two or three coaches and took them as the third section all-stations to Cambridge.

Strange to say a similarly exceptional double-heading has now come into regular operation during the present emergency working in connection with the wartime version of the same train now starting at 4.50 p.m. One locomotive is for the Peterborough portion from Hitchin, and the other for the Cambridge section. There has in the meantime been a great increase in engine power and also in the weight of those allowed to run in tandem combination. Usually at present two "Atlantics" work the 4.50 to Hitchin, though on occasions the leading locomotive has been a 2-6-0, a "V2" 2-6-2, a "B17" 4-6-0 "Sandringham" or even an A1 "Pacific."



Cleaning the spectacles. This is part of the lampman's job. Photograph by W. S. Garth, Luton.

Locomotive Variety at Peterborough

At the East station, Peterborough, which is the property of the L.N.E.R., it has been customary for many years to see locomotives of the former London and North Western and Midland Companies that had worked in with passenger trains from Rugby and Leicester respectively. Observation there recently showed considerable new variety under wartime conditions, as veteran "F1"-class Stirling 4-4-0s from the Eastern section of the S.R. on loan to the L.M.S. were sharing the running from the west with Midland type 4-4-0 Compounds and classes "2" and "3" 4-4-0s. L.M.S. 2-6-4T engines presented a modern note and there were also representatives of that huge family, the class "4" Midland type 0-6-0, which are "maids of all work." L.N.E.R. locomotives there included G.C. "D9" and G.E. "super-Claud" 4-4-0s, as well as a G.N. rebuilt Ivatt 0-6-0 of class "J3."

In the vicinity of the North station all the varied locomotive variety of the East coast main line was to be seen, as well as former Midland and Great Northern Joint engines with their numbers prefixed by a "0," and also, of course, L.M.S. engines from the Midland division on their way down to the East station.

Great Western Items

All passenger coaches with the exception of those forming the "*Cornish Riviera Express*" and a few other specially selected vehicles are being painted brown all over as they go through the shops, so that the popular chocolate and cream finish is largely disappearing for the time being.

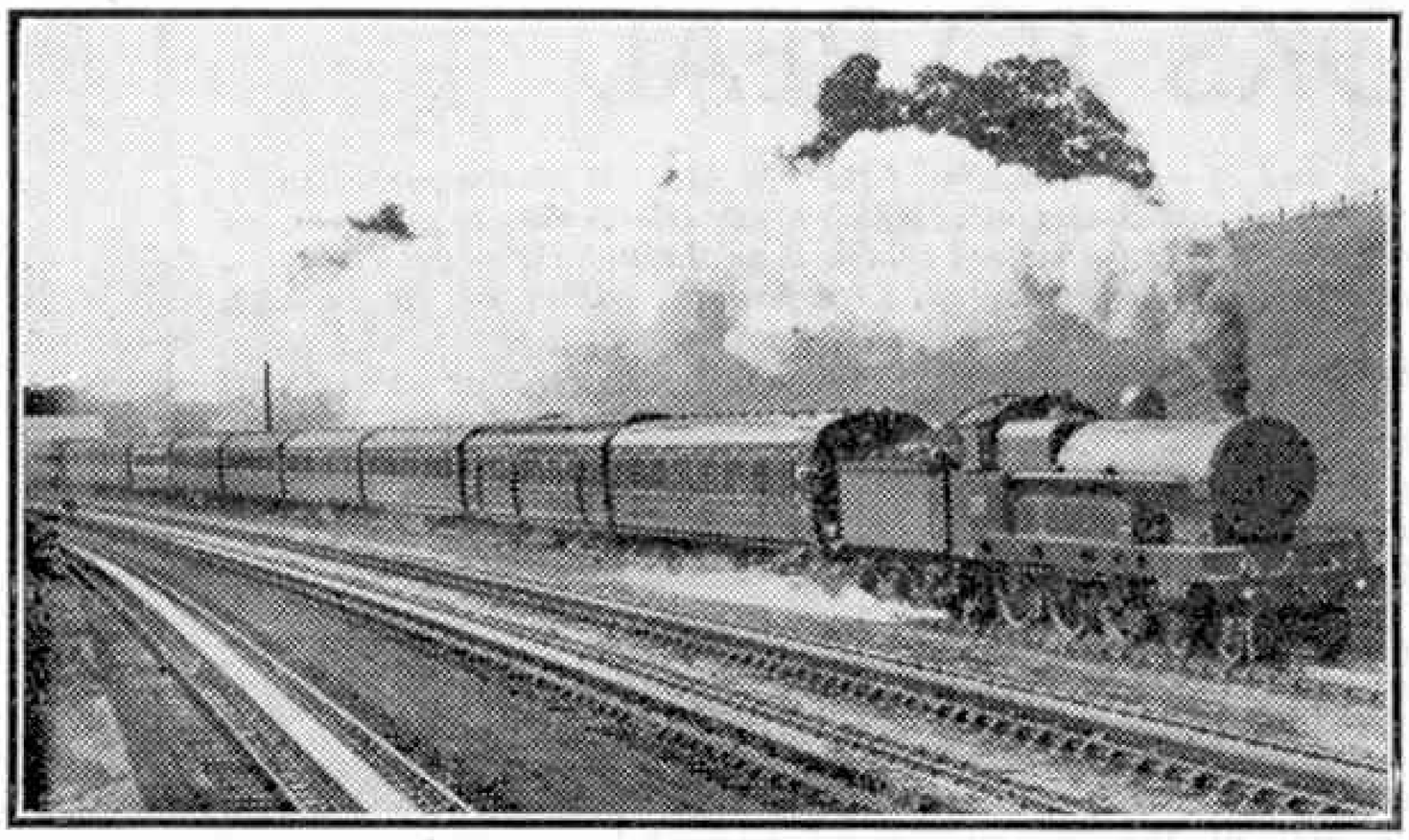
New 2-8-0 locomotives are completed up to No. 3850, also 0-6-0Ts numbered 4617-22. The shed allocation of engines is painted on the frames as they leave works. "Castle" class locomotives have lately been appearing in unlined green, but "Stars," like the majority of others, are now being turned out black. Pannier tank 0-6-0 engines still do a considerable amount of local passenger work in different parts of the country.

Naming of New S.R. "Pacific" Locomotive

An interesting ceremony took place at the S.R. Railway Works in Kent when the 4-6-2 locomotive No. 21C6 was named "*Peninsular and Oriental*" by Sir William Currie, Chairman of the P. and O. Steamship Line. Sir William recalled that it was just 100 years since his company instituted sailings, in the early days of ocean steamships, between Southampton and the Mediterranean, and so began a lengthy link with the forerunners of the present Southern Railway.

We believe that this was the first time that an engine of the Bulleid "Pacific" type had been seen down the Eastern section, though the tenders for the new class are being built there. The Works at which the ceremony took place are busy also with more of the powerful new "Q1" 0-6-0 locomotives, which were illustrated and described in the June "*M.M.*" Another series of these engines is in hand at the plant of the former London, Brighton and South Coast Company, now the Central Section of the S.R., in Sussex, so that their unusual outlines will soon be familiar on many parts of the system.

Subsequent engines of the Bulleid "Pacific" type to be given their names were "*Shaw Savill*" and "*Aberdeen and Commonwealth.*" The nameplates of these locomotives were unveiled on 30th July at Victoria Station by Lord Essendon, Chairman of the two steamship lines after which the engines were named. The "*Jervis Bay*" was an Aberdeen and Commonwealth Line vessel.



A locomotive of the former L.N.W. "Claughton" class at the head of a heavy express passing over water troughs.

Electrification and Standardisation in Sweden

Sweden has an inexhaustible supply of hydro-electric power, usable for transport instead of imported coal, at present difficult to obtain and of poor quality, or of home grown wood of low steam-raising qualities. Considerable progress therefore has recently been made with main and branch line electrification in Sweden. Further large sums of money have been voted by the Riksdag, or Parliament, for the purchase of electric locomotives and rolling stock, for the building of storage sheds for reserve steam engines, and for track improvements. Heavy iron ore trains are operated electrically, and the journey time over certain long distance routes through mountainous country has been reduced by one-third for both passenger and freight traffic.

L.N.E.R. Locomotive News

At the time of writing the 3641-54 series of "Green Arrow" 2-6-2s was almost completed, and now more than 150 examples of the class, numbered 4771-4899 and 3641-3664, are in service. A further 10 are on order. The N.E. area 4-6-2 "Pacific" locomotives 2568 "*Sceptre*" and 2574 "*St. Frusquin*" have been converted from the "A1" class to the "A3" by the provision of boilers pressed to 220 lb. per sq. in. and enlarged superheaters.

The Stratford "Coffee Pot" Locomotive

Many readers will remember the small 0-4-0 outside cylindered shunting tank engine which was exhibited as the "Coffee Pot" at various places on the Great Eastern section of the L.N.E.R. on the occasion of displays of rolling stock during recent peacetime years. As L.N.E.R. 7230 she is the last survivor of a small class introduced in 1873, although she herself was not built until 1903. She is now classed "Y5" and forms part of the departmental stock employed at Stratford Works. The wheels are 3 ft. 6 in. diameter and the wheelbase is only 5 ft. 9 in.; the frame is 18 ft. 3 in. long and the boiler barrel 8 ft. 8 in. in length. Boiler pressure is 120 lb. per sq. in., heating surface 487 sq. ft., and total weight in working order only 17 tons 3¼ cwt. The tall narrow chimney suggested the nickname "*Coffee Pot.*"

Queen Victoria's First Railway Journey

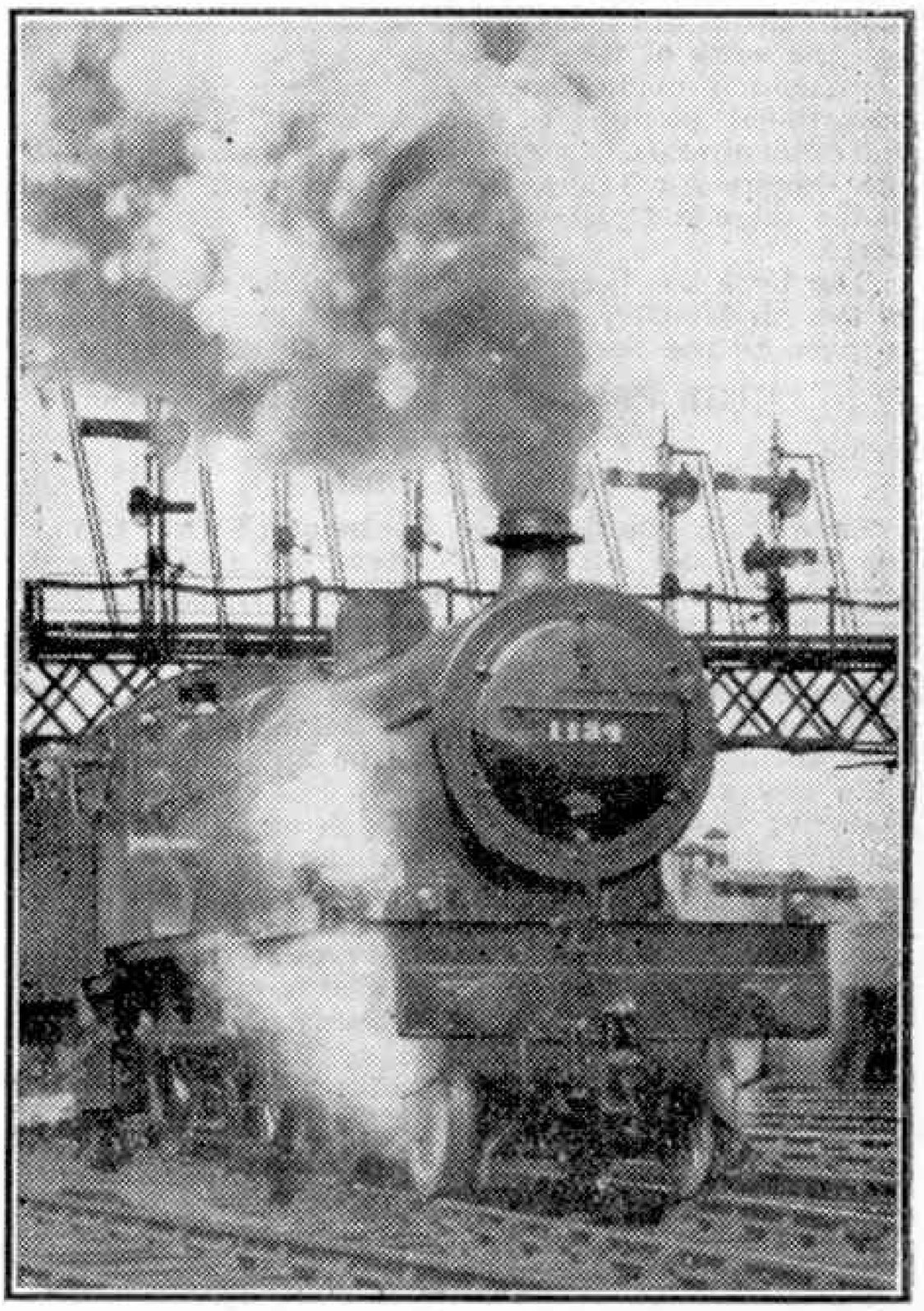
On 13th June this year we were reminded that it was exactly 100 years since Queen Victoria, then aged 23, made her first railway journey, by special G.W.R. train at 12 noon from Slough, near Windsor, to Paddington. The 18½ mile journey was accomplished in approximately 25 min., which was good going for those early days. The broad gauge 2-2-2 single engine with 7 ft. wheels employed bore the name "*Phlegethon*," and it is recorded that Daniel Gooch, then Locomotive Superintendent, was driving, while Brunel also was on the footplate.

Innovation in British Sleeping Cars

As an experiment in order to economise space at a time when sleeping berths are in great demand, the L.M.S. Company have fitted two beds, one above the other, in the end compartments of certain sleeping cars working between Euston and Glasgow. The upper berth is reached by a light, portable ladder and is provided with separate lighting. This is a novel departure from the hitherto universal understanding in this country and most others that first-class sleeping-car passengers should have the exclusive use of a compartment. Indication of course is given at the time of booking, and single berth compartments are still provided.

A Railway Veteran

The death has recently been announced of Mr. Daniel Willard, who until last year was President of the Baltimore and Ohio Railroad. Mr. Willard's career was a real railway romance, for he began as a platelayer on the Central Vermont Railway. For the next 30 years he worked on various American railways. The last of these was the Baltimore and Ohio, and in 1910 the former platelayer became President of this railway, which to-day has 6,440 miles of track. Mr. Willard occupied this position for 31 years.



L.M.S. 4-4-0 locomotive No. 1134 leaving a terminus. It was acting as pilot of a heavy train. Photograph by O. S. Nock.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 6d. for postage.

"R.A.F. THE SECOND YEAR"

(A. & C. Black. 7/6 net)

This book is the successor to "*The R.A.F. in Action*," of which many thousands of copies have been sold, and which was reviewed in the March 1941 "*M.M.*" It is a splendid record in word and picture of the achievements of the Royal Air Force during the second year of the war. The brief descriptions of the functions and activities of the R.A.F. Commands given in the earlier volume are brought up to date, and interesting notes have been added on the work of the Maintenance and Training Commands and of the Middle East Command.

The pictorial section again includes over 100 specially selected photogravure illustrations. These cover every branch of R.A.F. activity, from the manning and flying of huge four-engined heavy bombers to the less spectacular but very important work of the Royal Observer Corps and the W.A.A.F. Chief emphasis in this volume is on bombers, and we have fine pictures of Stirlings, Halifaxes and other newer aircraft of this type, showing the men at their briefing before a raid and at their posts in the aircraft itself. The R.A.F. is seen at work in Russia and Iceland, night-fighters are illustrated, and the work of the Coastal Command is made clear by operational pictures of "Sunderlands," "Catalinas" and other aircraft. Army co-operation, rescue work and the Empire Air Training scheme are dealt with, and finally there is a pictorial glimpse of the Air Training Corps.

The book has been produced with the co-operation of the Air Ministry, and a royalty on every copy sold is given to the Royal Air Force Benevolent Fund.

"THE PROWLERS OF THE DEEP"

By Franklyn Kelsey

(Harrap. 8/– net)

Once again Jim Armitage, Conky and Shorty fall in for an unusual adventure. These old friends have figured in previous exciting stories by Mr. Kelsey, who in his latest book has shown his usual skill in telling us how they deal with a foreign spy and a rascally financier who set out to terrorise the world. The weapons of these villains are a submarine that can dive to a greater depth and attain a greater speed than any vessel of the type previously known, and powerful rays that will cut through armourplate and kill any man on whom they are turned. The inventor of these devices has even created steel Robots to construct the submarine and to man it! The pirates work systematically to destroy shipping, but they are tracked down by our heroes, together with Alan Scarlet of the Admiralty, and there are many thrilling adventures for all of the party before the submarine is destroyed and the villains are killed on a mysterious island in the West Indies that they had made their headquarters.

SPICE HO!

By A. D. Hewes

(Routledge. 6/–)

Miss Hewes has written a fine story of the voyages that revealed the Far East to the Europeans of 400 years ago, and the search for spices with which to flavour the unattractive salt meat and fish that were staple fare in those days.

The Venetians first brought pepper, cloves, nutmeg and other condiments from the Eastern Mediterranean, and they had the trade to themselves until Portuguese navigators found their way round Africa to India, and on to the romantic Spice Islands, and Magellan reached them by sailing round the world in the opposite direction. In the story we share in the adventures of these great pioneers, after which we read of the three-cornered fight between the English, the Portuguese and the Dutch for supremacy in the East Indies. Finally we read how cloves, nutmegs and other spices came to be grown in Zanzibar, Mauritius and elsewhere outside the Spice Islands themselves.

The story reveals an unusual aspect of exploration, and is illustrated by excellent drawings and a good map.

Owing to wartime difficulties, it is impossible to guarantee prompt delivery of books ordered as described at the head of this page, but every effort will be made to ensure speedy despatch.

"BITS AND PIECES"

By B. Bira

(Foulis. 7/6)

Here for the first time Prince Birabongse of Thailand, better known in the motor racing world as B. Bira, has set down for all to read his own account of his career on racing track and road. He has not attempted to tell the whole of his story in order from the beginning, preferring to give us recollections of his greatest races and of other thrilling events in which he has been concerned, and this explains the title that he has chosen. His chapters will be read with intense interest by all who are keen on motors and motor racing. It will be found that they not only give the facts of the events dealt with, but also they reveal the thoughts and personality of the author himself. The reader gradually builds up a picture of Bira, with all his hopes and fears, both before and during a race, and he learns to appreciate the modesty as well as the skill of the author, who takes misfortune philosophically and is not spoiled by success.

The stories begin quietly with an account of a crash due to impetuosity, but we soon come to a victory, for this is followed by an account of his first important win, in the Monaco circuit. Then we accompany Bira in races at Brooklands, Donington Park, Montlhery, Nürburg, and indeed on all the famous tracks and road circuits of Western Europe. With him we meet one famous motor racing figure after another, including Pat Fairfield, Dick Seaman, Nuvolari, Arthur Dobson and others whose names are household words; and our interest never flags, for no two races are alike to us when we are able to see them through the eyes of one of the competitors. A pleasant feature of the book is the return to Thailand in the final chapters, with the authors' reminiscences of his boyhood days. One of the most exciting chapters tells of a terrific duel at Brooklands with Raymond Mays in a works E.R.A., who whizzed past Bira in a manner that gave him a real fright. On the last lap Bira was a car's length in front, with Chula urgently signalling him to go faster, but Mays passed him. He recovered lost ground by getting into his rival's slipstream, and in the end he got ahead again while swooping down from the banking into the finishing straight, to win by a narrow margin.

The book is well illustrated by excellent photographs.

Engineering News

London's New Bridge

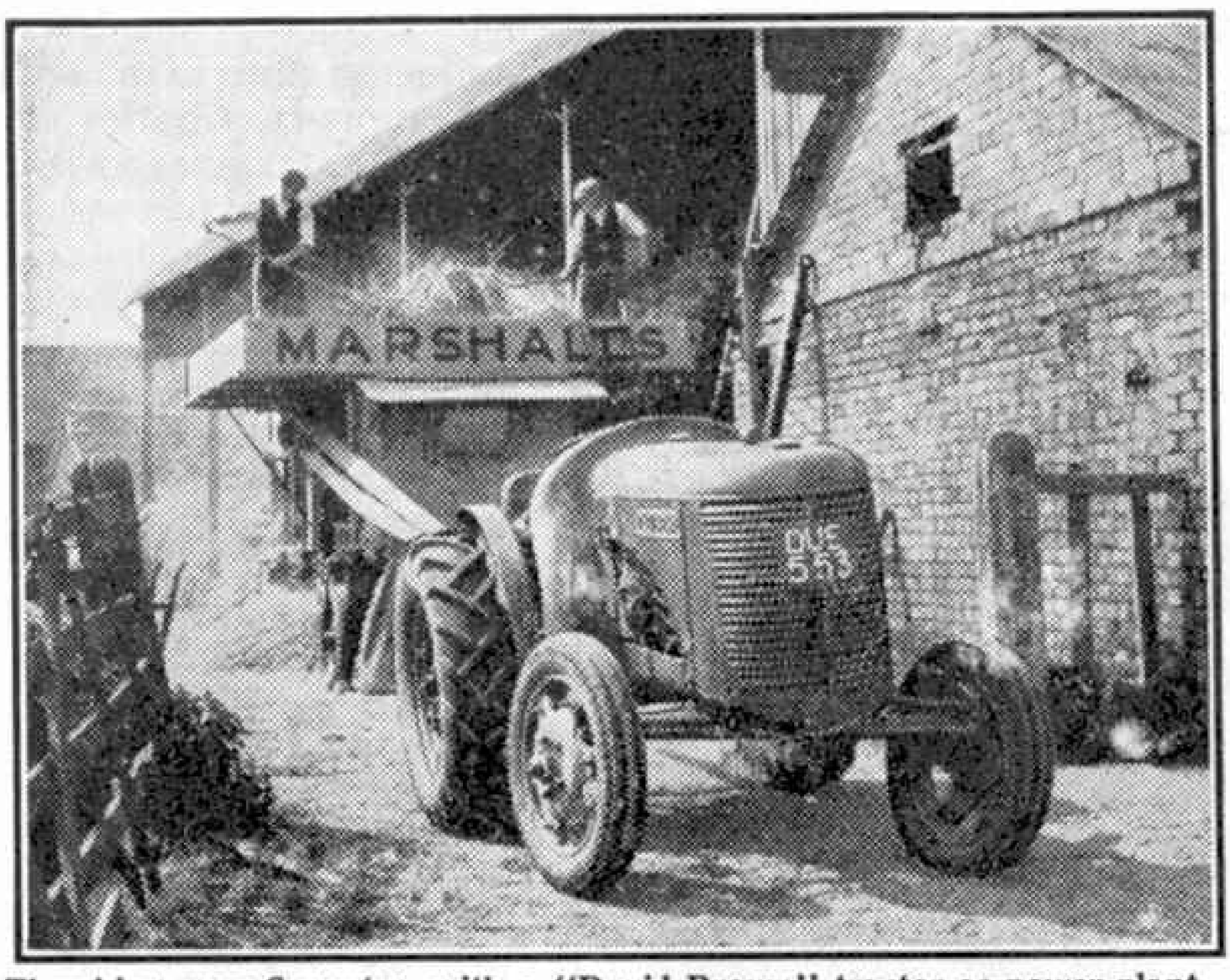
The new Waterloo Bridge was opened without ceremony on 11th August, the event marking the completion of a task that has occupied five years. The bridge replaces that built by Sir John Rennie and completed in 1817, which had become defective owing to the settlement of the pier footings. One pier had sunk about 2ft. 4in.

The new bridge has five spans of box girder type. Each of the three central spans is 252.7ft. long, and the end spans are 242.7ft. long, giving a total length of 1,243.5ft. Reinforced concrete members are continuous over the two spans at each end, and the middle span is a suspended one carried by cantilevers over the central opening. At each end there is a road approach viaduct. The width, with two pavements and a roadway for six lines of traffic, is 80ft. between parapets. Rennie's bridge was only 42ft. 6in. wide.

The bridge is carried by four piers which were built inside cofferdams. They are carried down into the London clay, 20ft. below the river bed, and each rests on a mass of heavily reinforced concrete 6ft. thick and 27ft. across. The real supports of the bridge are not visible; they are reinforced concrete walls connected solidly with the superstructure. They are strong enough to carry the weight of the bridge, and round them are cellular shells of reinforced concrete to protect them from possible damage from ships or barges. It is these shells that are visible from the banks. Their walls are tied together by cross members passing through openings in the real piers, and they are faced with granite between the high and low water marks and with Portland stone above high water.

An interesting feature of the bridge is that the supporting walls are flexible enough to allow for movements of the bridge caused by temperature changes. Because of this some means of restraint had to be used, and what are called "inertia walls" have been built at each end of the bridge for this purpose. These walls are connected to the superstructure.

At present only two lines of traffic are allowed on the bridge, but the full width will become available when work on the northern end, on which the temporary bridge encroaches, has been completed. The bridge would have been finished in 1940 if the war had not broken out, and certain work, such as the provision of permanent railings along the bridge, and the building of two of four staircases giving access to it from the Embankments, is being postponed until after the war.



Threshing near Coventry, with a "David Brown" tractor as power plant. This photograph, by C. Oakes, Hawkesbury, Coventry, won a prize of £3 3s. 0d. in the 7th "David Brown" Photographic Contest. Details of the 8th contest of the series appeared on page 302 of the August "M.M."

Magnesium from the Sea

There are in the sea enormous quantities of valuable raw materials for industry, but the proportions of these are so small that until recently it has been impracticable to extract any of them except salt, the most abundant constituent of sea water. In hot countries this has long been obtained by allowing sea water to flow into large shallow basins to be evaporated by the heat of the Sun. To-day valuable products such as bromine and magnesium also are obtained from the sea in large quantities. Bromine was the first to be extracted, and an article explaining how this is done appeared in the "*M.M.*" for February 1935.

There is only one part of magnesium in 800 parts of sea water, yet a large plant has been erected on the shores of the United States for the extraction of the metal. Lime is required for the process, and it is interesting to find that this is made from huge deposits of fossil oyster shells found near the site. The lime is mixed with the sea water to precipitate a compound of magnesium, which is dissolved in hydrochloric acid. This forms magnesium chloride solution, which is evaporated and the product dried. The metal is then extracted electrolytically.

It is expected that the plant will produce 100,000 tons of the metal by the end of the year, and to obtain this amount about 12,000 million gallons of sea water will have to be pumped through it.

Salvaging the "Lafayette"

The United States steamship "*Lafayette*," better known by its former name "*Normandie*," is now being righted and refloated. This famous vessel, the rival of the "*Queen Mary*," was being converted for wartime service in New York when she caught fire, and so much water had to be pumped into her to extinguish this that she heeled over and lay on her side, with the bases of her funnels just clear of the surface of the water.

The vessel is to be salvaged by pumping the water out, the list and trim being kept under control as she is floated and righted. All openings in the outer hull and in the promenade deck are being closed to make them watertight, and the part of the promenade deck under water is being reinforced to enable it to withstand external water pressure. Divers are being employed in this and other work on a larger scale than has yet been undertaken. The greatest care will be necessary to avoid disturbing the mud on which the greater part of the ship is resting, in order to prevent the vessel from sinking further into it. Fortunately part of the weight is supported by the edge of the rock shelf at the shore end of the slip where the vessel is lying.

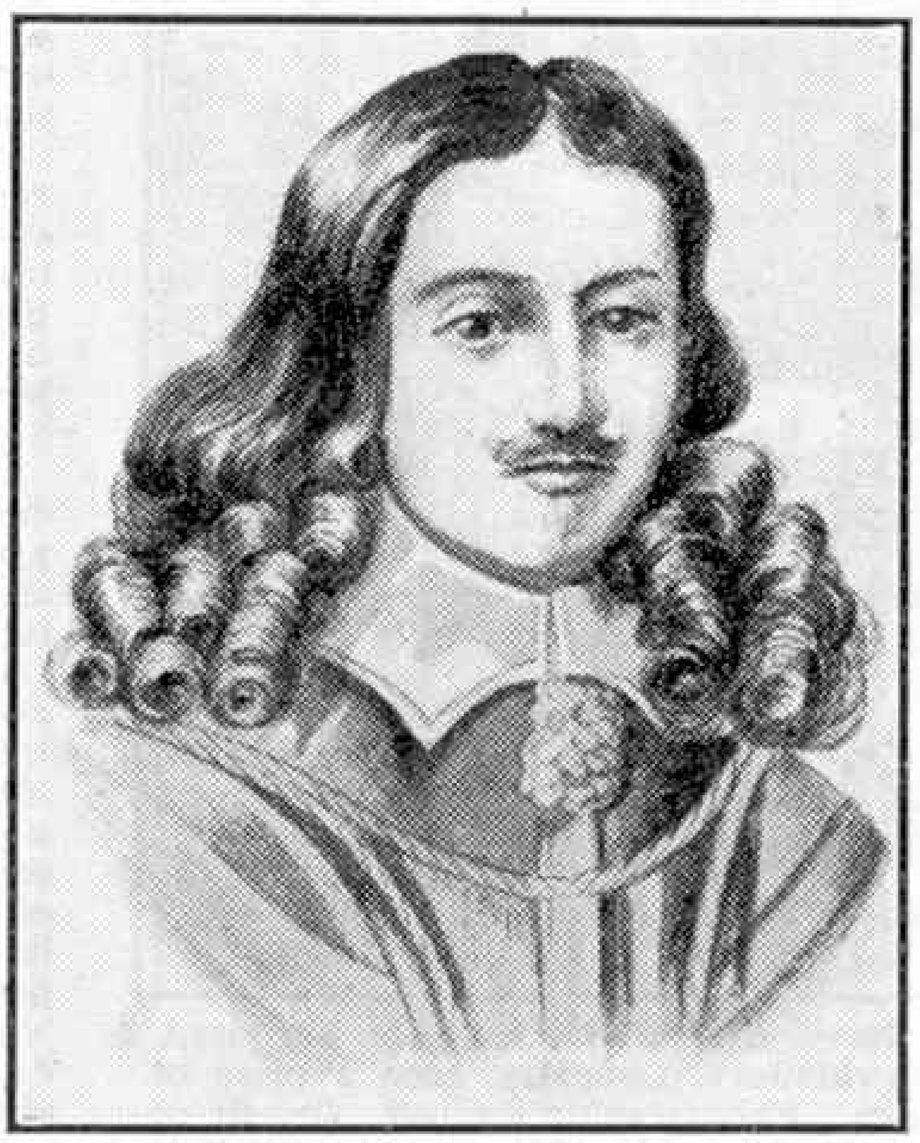
Part of the end of the pier alongside will have to be removed to allow the vessel to right herself.

Famous Inventors

The Marquis of Worcester

A Pioneer of the Steam Engine

IT is widely believed that the inventor of the steam engine was James Watt. Watt's name is the greatest in the story of the development of the steam engine, but other inventors contributed to this story, and there were steam engines at work many years before Watt was born. The application of steam indeed really dates back more than 20 centuries, but the credit for first putting it to work belongs to Edward Somerset, Marquis of Worcester, who actually raised water by steam power at Vauxhall, London.



Edward Somerset, Marquis of Worcester, 1601-1667.

Edward Somerset was born in 1601. He spent his early life at Raglan Castle, Monmouthshire, in almost princely surroundings, for the Earls of Worcester owned immense estates in South Wales and London, and the castle was one of the greatest in the country. His time was spent chiefly in scientific pursuits with the help of Caspar Kaltoff, a mechanic who remained in his service practically throughout his life. He devised many amusing toys, drawing instruments and mechanical devices, and it was then that he made his earliest efforts to produce what he called his water-commanding engine. Unfortunately no account of this exists, and the only traces that remain are grooves and cells in the wall of the citadel of Raglan Castle. These are shown in our illustration, and with the knowledge of the later engine that he erected at Vauxhall they enable us to understand the scale and the general arrangement of this pioneer effort. The largest cell is built above the arched interior of the entrance to the drawbridge of the castle, and is a little more than 6 ft. high in the centre. Rising from it are two grooves, each about 1 ft. in width and 1 ft. in depth, and on the right is a second groove, at the lower end of which are smaller grooves and another cell. It is probable that the grooves contained pipes through which water from the moat was forced upward to be discharged into a cistern on the roof of the castle.

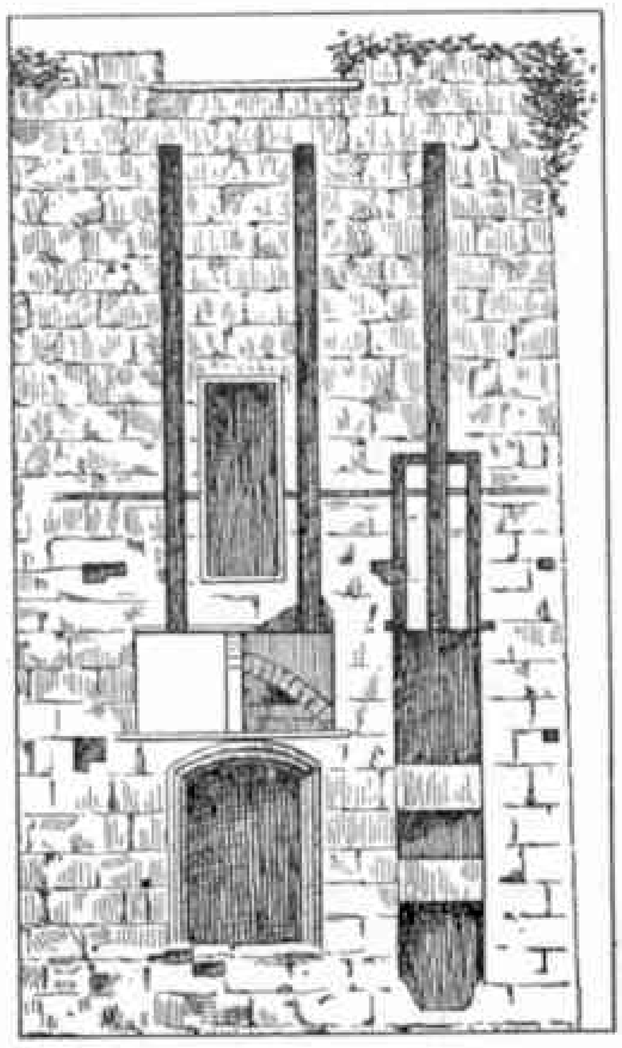
While the inventor was engaged in these pursuits the Civil War broke out. He and his father were convinced royalists, and gave not only their services, but also immense sums of money to support Charles I in his struggles with Parliament. They were constantly appealed to by the King for money, of which he was always in the greatest need, and in addition they raised troops that were maintained at their own expense. Towards the close of his life the inventor calculated that he had spent and lent for his King and country £918,000, an enormous sum for that period, equivalent to several millions of our present currency. The inventor himself was created Earl of Glamorgan and was sent to Ireland to raise troops, but on the final defeat of the King he fled to France, where he lived in comparative poverty until 1652. Then he returned to London, only to be imprisoned for three years in the Tower. When he was released he was probably kept under strict observation, his only solace being the mechanical contrivances and inventions by which he had always been attracted. His estates had been confiscated, large portions passing into the hands of Cromwell.

It was at this time that the inventor went to live at Vauxhall, and began to interest himself again in the development of his water-commanding engine. While he was there Charles II returned, but this did not bring him great relief, for although Raglan Castle and his estates were restored to him they had been so despoiled that he gained little from them and he never recovered the vast sums expended on the

King's behalf. He continued his efforts to put into practical operation his schemes for raising water, still with the help of Caspar Kaltoff, and there is no doubt that he was successful. A French visitor who went expressly to Vauxhall to see this wonder describes it as a machine that in a single minute would raise four large buckets of water to a height of 40 ft. through a pipe 8 in. across.

The exact details of the Marquis's water-commanding engine are somewhat obscure, for no drawings are available. From the descriptions the machine appears to have worked in the manner indicated by the lower illustration on this page. Steam from the boiler on the right entered the vessel on the left and forced water from it up through the vertical tube rising from it. When the vessel was empty the tap through which the steam entered was closed and water was again allowed to flow in, after which the whole operation was repeated. The Vauxhall engine appears to have had two water cylinders, one being filled with fresh water as that in the other was being forced out by the steam. Only one man was required to control the engine, his task being to turn the taps as required.

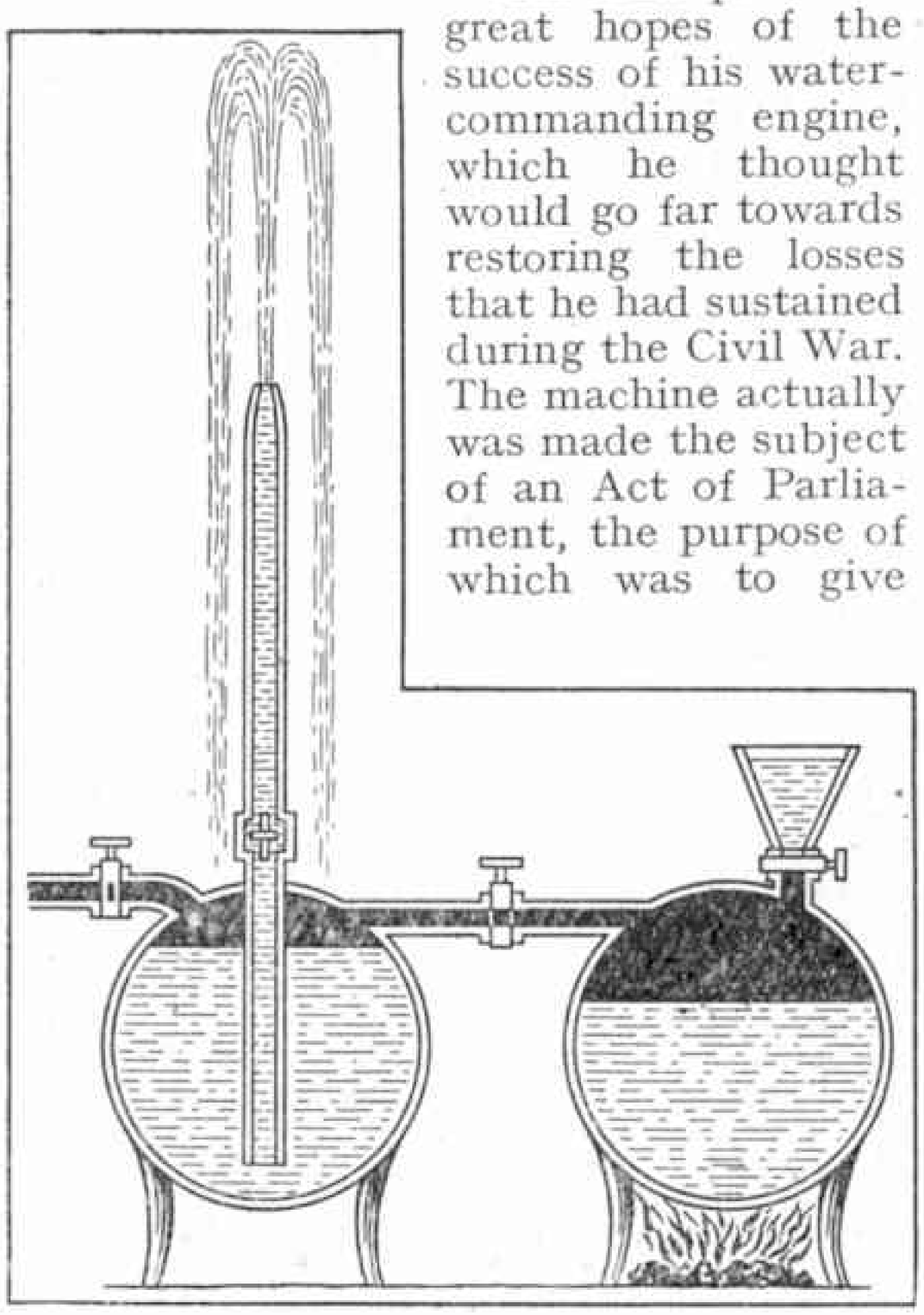
The Marquis had great hopes of the success of his water-commanding engine, which he thought would go far towards restoring the losses that he had sustained during the Civil War. The machine actually was made the subject of an Act of Parliament, the purpose of which was to give him the benefit and profit of the invention for 99 years. He claimed that it could be used for draining purposes, and for pumping water out of mines, but very few appear to have believed the scheme to be of any real value and the inventor's great hopes were disappointed. He died in 1667, only four years after the Act was passed. His widow continued to give the scheme attention, but nothing is known of the fate of the Vauxhall engine. There is no doubt that it helped to inspire later inventors, notably Morland, who was master mechanic to Charles II, and still more Thomas Savery, a military engineer who about 30 years later devised and brought into use a steam pumping engine that worked on practically the same principle as the Marquis's water-commanding engine.



Cells and grooves in the wall of Raglan Castle.

The Marquis was full of schemes, and inventions, many of which he described in a remarkable book *"A Century of the Names and Scantlings of Inventions."* This contained brief descriptions of 100 remarkable inventions that he claimed to have already practised. His water-commanding machine is numbered 68 in this collection, in which is included an engine that can be carried in the pocket and yet when fastened on the inside of the greatest ship will sink it at any appointed time. Not content with this he speaks of a way to dive from a distance of a mile to fasten this remarkable engine to a ship, and also includes an invention for preventing attempts to destroy ships by this method! No details are given of these and many other astonishing "inventions," such as a brazen head capable of answering in French, Latin, Welsh, Irish or English, questions whispered into its ear.

The Marquis called his book "the most stupendous work in the whole world," and it certainly would have deserved this description if all the inventions had been really practical, and not the fanciful schemes many of them actually were.



The steam fountain. Worcester's water-commanding engine is thought to have worked in a similar manner to this device.

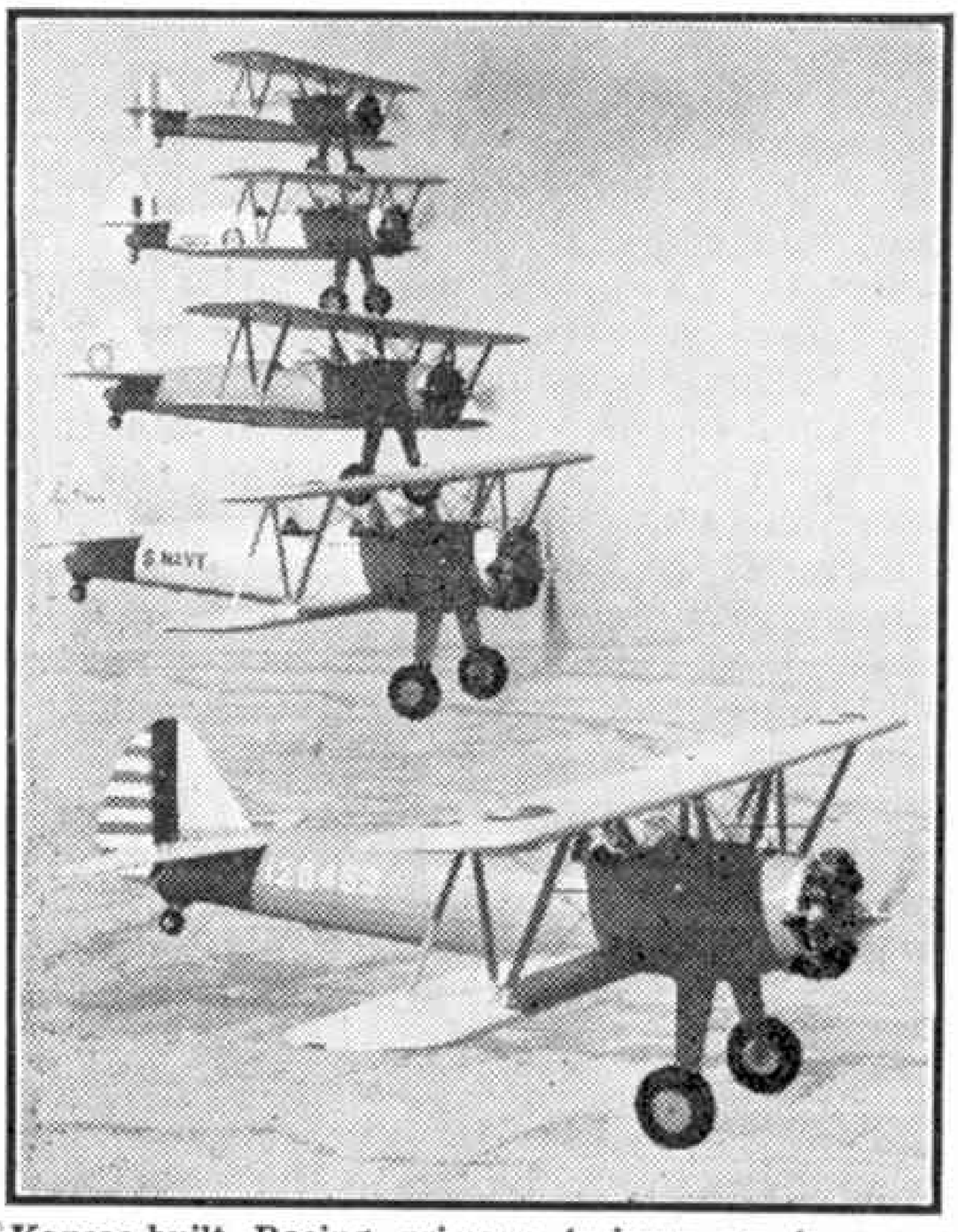
Air News

Avro "Lancaster" Bomber

Details of the Avro "Lancaster," the latest type of British heavy bomber, have been released for publication. These fine machines first came into the news last April when they carried out a very successful daylight raid on the submarine engine plant at Augsburg, and they have since taken part in big night raids by R.A.F. Bomber Command. On 11th August last they made one of the most daring raids of the war, when they attacked the Baltic ports of Danzig and Flensburg in daylight, an exploit that involved a round trip of 1,750 miles.

The "Lancaster" has a range of 3,000 miles, and can carry up to 8 tons of bombs. In spite of this great load it has a top speed of about 300 m.p.h., which is almost as high as that of the standard British fighters of only a few years ago. This big 4-engined, 30-ton bomber has a wing span of 102 ft., is 69 ft. 6 in. long, and 20 ft. 6 in. high. The bomb compartment in the fuselage is 33 ft. long, and the four engines are Rolls-Royce "Merlins." Its armament consists of 10 Browning .303 machine guns, two each in the nose, midway upper, and midway lower turrets, and four in the stern turret.

In addition to the large number of "Lancasters" being produced in this country, the type has been put into production at one of the largest Canadian aircraft factories.



Kansas-built Boeing primary trainers go to many Allied nations. The machines shown here are destined for (top to bottom): Peru, Great Britain, China, U.S. Navy, and U.S. Army Air Forces. Similar trainers have been delivered to Brazil, Venezuela, and Cuba. Photograph by courtesy of the Boeing Aircraft Company, U.S.A.

* * * *

The Service markings of aircraft of the U.S. Army Air Forces now include a white star in a blue circle instead of the familiar red circle inside a star.

United States to Build Giant Freight-Carrying Aircraft

The War Production Board in the United States announced last month that they had approved the construction of 500 "Mars" type flying boats by Mr. Henry Kaiser, the West Coast shipbuilder who successfully introduced "assembly line" methods in ship construction at his yards. For some time past he has been strongly urging the Government to sanction the building of a fleet of huge freight-carrying aircraft to offset the sinkings of freight shipping by enemy submarines.

According to Mr. Donald Nelson, Chairman of the War Production Board, the U.S. Navy will place an initial order for 100 of the proposed flying boats with Mr. Kaiser, and if he is successful in carrying it out a further order for 400 boats will follow.

The "Mars" is the great Martin XPB2M–1 flying boat, which has a wing span of 200 ft., a loaded weight of 62½ tons, and four 2,000 h.p. Wright "Duplex Cyclone" engines which enable it to fly at more than 300 m.p.h. If used as a troop transport it could carry 150 men and all their equipment.

Important Appointment for Noted Australian Airman

Group Capt. Harold Gatty of the Royal Australian Air Force, has been appointed a Director of Air Transport in the U.S. Army Air Forces stationed in Australia. This officer is well known as the companion of Wiley Post on an outstanding round-the-world flight in 1931. Gatty is a native of Tasmania, and at the time of the great flight he was running an air navigation school in Los Angeles, U.S.A. Post was the personal pilot of F. C. Hall, who had large oil interests in that country, and who sponsored the flight. The two men took off from Roosevelt Field, New York, on 23rd June in Hall's Lockheed Vega single-engined monoplane *"Winnie Mae,"* with Post at the controls and Gatty acting as navigator. After flying by way of Harbour Grace, Newfoundland, to England, they continued to Germany, Russia, across Siberia and the Bering Sea to Alaska, thence south-eastward across Canada back to the United States, landing at New York on 2nd July. Their 15,500 miles flight took 8 days 15 hrs. 51 min.

World's Fastest Army Co-operation Aircraft

North American "Mustangs" are now in service with the R.A.F. Army Co-operation Command as fast fighting scouts. Air Marshal Sir Arthur S. Barratt, the Commander-in-Chief, has sent a message to North American Aviation, Inc., the makers of these fine machines, expressing the pride of his Command at being the first to use the "Mustang" over enemy-occupied territory. He added that his pilots are delighted with the machines.

This American single-seater fighter which has proved a great success on high-speed reconnaissance work is built to a British specification. It is a low wing monoplane with a 1,150 h.p. Allison liquid cooled engine, and although performance details are not available it is said to be the fastest Army co-operation machine in the world. Its high speed, especially at low altitudes, is of great value, as in modern Army co-operation work it is more than ever essential that information about enemy activities be obtained as quickly as possible. The "Mustang" has six machine guns, four in the wings, two in the nose.

In addition to purely Army co-operation work the pilots of the R.A.F. "Mustangs" have been gaining experience in "ground strafing" by taking part in the low-flying sweeps over enemy territory carried out by Fighter Command, R.A.F.

* * * *

A flight over Mt. Everest, which is 29,002 ft. high, is reported to have been made by the Commander of a U.S. Army Air Forces pursuit squadron, when he made a detour during a recent flight from India to China.

The British Airways air liner "St. Louis" being turned on an aerodrome. It is the largest twin-engined landplane in the world. Photograph by courtesy of Curtiss-Wright Corporation, U.S.A.

Record of the Horseshoe Section

The 12 Empire flying boats of British Airways based at Durban and used on the Horseshoe section of the Empire air routes are now flying at the rate of 20,800 hrs. per annum. This is a distance of nearly 3,000,000 miles and an average of about 250,000 miles per aircraft. Engine hours for the same aircraft have reached the high figure of 83,200 a year. This does not include ground running, test flights, etc.

Three of the Empire flying boats—"*Castor*," "*Canopus*," and "*Cameronian*"—have each completed 1,000,000 miles of flying since they went into service. "*Canopus*" was the first of the S.23s to be delivered in October 1936; "*Castor*" was the fifth to join the fleet, beginning service in December 1936; and "*Cameronian*" went into service in October 1937.

Air Training Corps News

On the 13th July last the Air Training Corps passed under the direct control of the Air Ministry. Air Commodore J. A. Chamier, the Commandant, who had developed the Corps to its present efficiency and great size, has been made Inspector of the A.T.C., a newly-created post.

Air Chief Marshal Sir Arthur Longmore, former Air Chief in the Middle East, has just carried out a 10-days' flying tour of 16 R.A.F. stations where A.T.C. cadets of the North East Region are now at their summer training camps. During the next few weeks about 30,000 cadets, representing 210 A.T.C. squadrons in Yorkshire, Durham, and Northumberland, will be spending a week with the R.A.F. Many of the camps are at active operational stations. The North East Region A.T.C. is under the command of Air Commodore Sydney Smith, O.B.E.

An exhibition run by the City of Edinburgh Wing of the A.T.C. will be held this month in the Royal Scottish Academy in that city. It will be formally opened on 8th Sept. by the Lord Provost of Edinburgh, and the grey-kilted pipers of the City of Edinburgh's own A.T.C. Squadron will be in attendance. The exhibition will remain open until the 19th Sept.

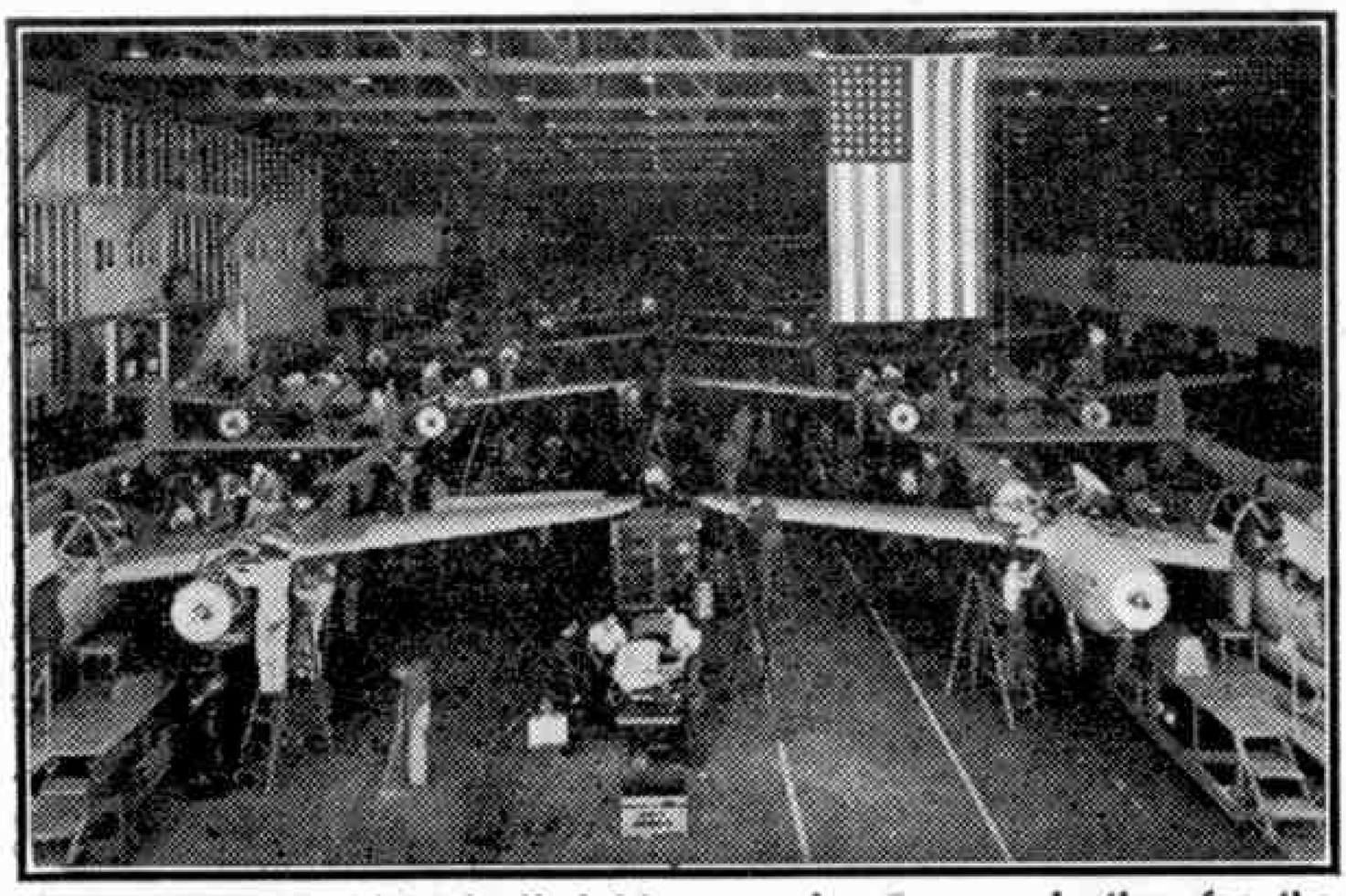
The many interesting exhibits will include British, Allied, and enemy aircraft replicas and scale models used in "recognition" classes for the air cadets. With these and other devices demonstrations of methods of instruction in aircraft recognition will be given. This instruction is an important feature of the preliminary training of air crews, and one for which the Scottish lads show an extraordinary aptitude. The Royal Air Force is lending full-size exhibits including aircraft engines, aircraft parts, and wireless transmitting and receiving apparatus.

"Bird Man" Teaches R.A.F. Parachutists

A "bird man" who before the war thrilled crowds by his descents from great heights, wearing "wings" he had designed, has just been awarded the Air Force Cross for his work in training parachute troops in the R.A.F. Army Co-Operation Command.

He is Flight Lieut. H. W. Ward, of Bradford, who was in the R.A.F. when he made his first parachute descent in 1925. He found that he enjoyed the sensation of dropping from high altitudes, and when he left the R.A.F. a few years later he toured with Sir Alan Cobham's Air Circus, and became Britain's first "bird man." He made his own big pair of wings, and wearing a parachute he had packed himself he used to jump from an aeroplane at 30,000 ft. or so, and descend gracefully to earth. Sometimes his wings broke, and then he would pull the ripcord of his parachute and make a more orthodox descent.

All this experience has made Ward invaluable for his present membership of a R.A.F. team of parachute-jumping instructors. He still makes experimental descents with new equipment, and he plans to continue parachute-jumping for at least another 10 years.



Lockheed P-38 "Lightning" fighters are in mass production for the Royal Air Force and U.S. Army Air Forces. Here is the scene in the Final Assembly hangar of the Burbank plant of the Lockheed Aircraft Corporation, U.S.A., by whose courtesy this photograph is reproduced.

Niagara's Latest Bridge

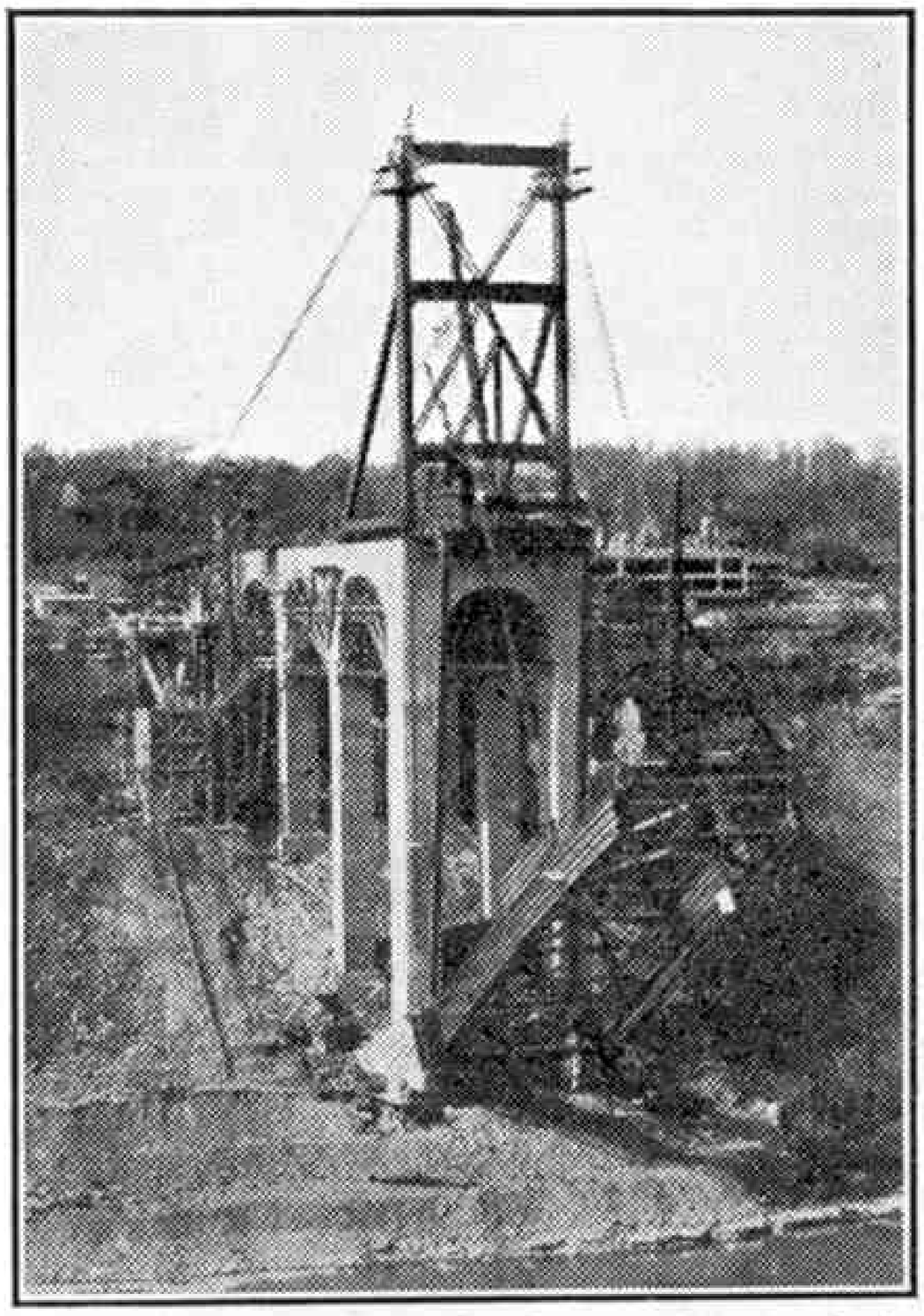
A Steel Arch with a 950 ft. Span

THERE are few places in the world more fascinating than Niagara. Over a million people visit the Falls every year, and are awed by the stupendous rush of water and the fury of the whirlpool in the great gorge that the river has carved out below the cataract. Niagara is intensely attractive also from an engineering point of view. It is famous for its hydro-electric plants, which convert the energy of the Falls into electric power; and from time to time famous bridges have been built to span the river between the Falls themselves and the whirlpool. The gorge with its rocky walls 200 ft. in height lends itself to the construction of fine bridges, and 15 structures of various types have been built to span this turbulent stretch of nine miles. Only four of these now remain. Most of those that have gone were found to be incapable of carrying the ever-increasing road or rail traffic that wished to make use of them, but there also have been famous disasters, in which bridges across the river have been destroyed or damaged.

Of the many Niagara bridges those built just below the Falls have been the most fascinating. The first was a primitive transporter bridge, passengers being hauled over the chasm in an iron basket slung from a cable. This was followed in 1869 by a wooden suspension bridge supported from timber towers on the banks. There was room on this for only one line of traffic, vehicles from one side passing over for a period before giving way to those moving in the opposite direction. After 13 years' service the timber towers were replaced by others of steel, and in 1887 additional cables were installed so that the bridge could be widened sufficiently to allow for two lines of traffic, one in each direction. In its wider form the bridge did not last long, for the cables that prevented it from swaying were broken during a gale, and the entire structure collapsed into the river.

The bridge was rebuilt and was again in use within five months of this disaster. Traffic increased to such an extent, however, that a new bridge became necessary, and in 1898 a steel arch span was erected in its place. This came to an end in dramatic circumstances in January 1937. Severe winter conditions had prevailed at Niagara during the Christmas and New Year season immediately preceding, and when relief came and the ice of the Niagara River, and of Lake Erie behind it, broke up, immense floes were carried downstream by the swollen waters and were swept over the Falls into the gorge. There they were piled up, each additional floe being driven under the ice pack and raising it higher, until a height of 50 ft. was reached.

The foundations of the arch bridge were about 40 ft. above the normal level of the river, and thousands of tons of ice pressed on them with the force of a gigantic glacier. Strenuous efforts were made to keep the bridge footings clear of ice and to protect them with baulks of timber, and there seemed to be some hope of saving the bridge when, on the morning of 27th January, the level of the water was found to have sunk 4 ft. Shortly after 4 o'clock in the afternoon however the ice completed its destructive work. The United States end of the structure was pushed off its support, the deck of the bridge buckled and its centre rose upward until it seemed that the entire framework must snap. Then the Canadian end of the bridge was torn loose, and with a low rumble the bridge sank to the ice nearly 200 ft. below it.

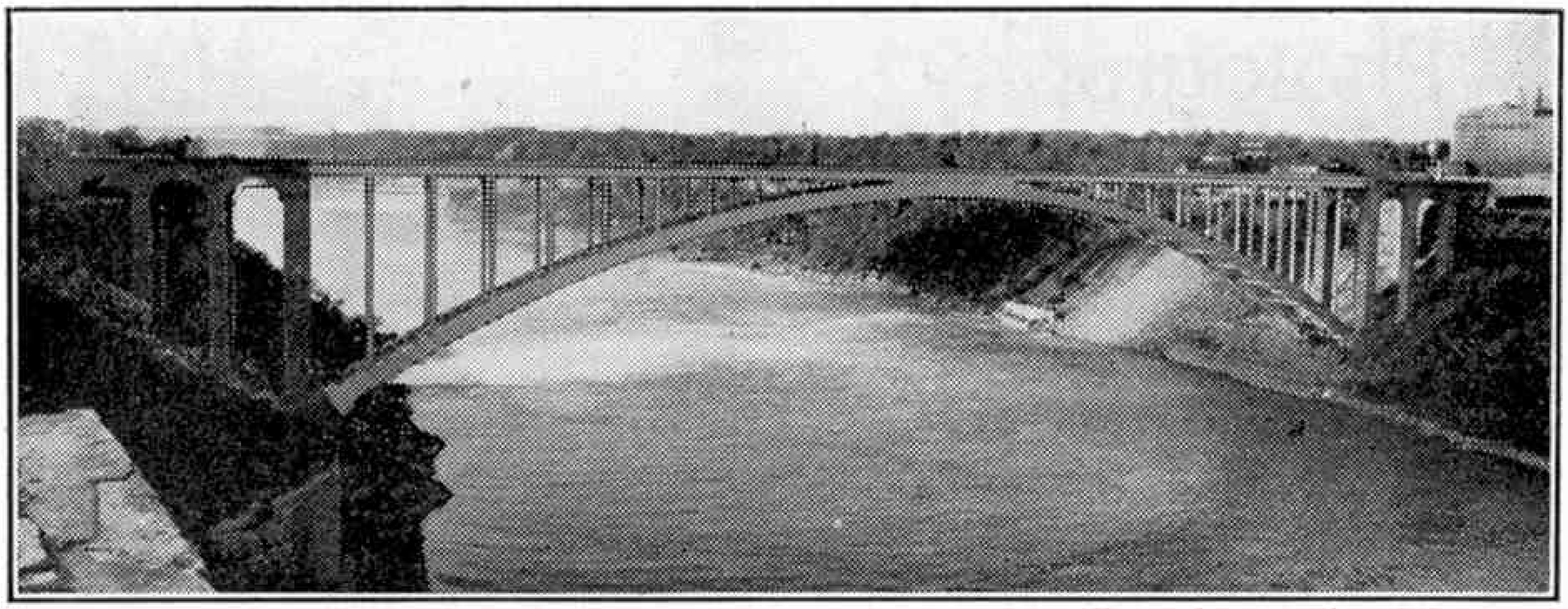


Building the Canadian end of the steel arch of the new Niagara bridge. The travelling crane has just been moved up the arch to continue erection.

Plans were made immediately to provide a new bridge, and these reached their climax last year when another handsome arch bridge spanning the gorge was completed. This bridge is 400 ft. farther downstream than its predecessor. In addition its foundations are 52 ft. above the average water level and 35 ft. above high water level, which is usually reached when ice jams are formed. Thus it is less liable to such a fate as that of the former arch bridge, and yet it provides the splendid view of the great Falls that was one of the great attractions of the earlier suspension and arch bridges. It has been named the Rainbow Bridge, because it symbolises in steel the rainbow that can be seen in the mists that rise from the foot of the Falls when they are lit up by the Sun. It was decided to erect an arch bridge again because a structure of this type fits in better with its surroundings than a suspension bridge would do, and our illustration of the new structure shows that it does not mar the scenic beauty of Niagara.

The new bridge is a simple arch, with a span of 950 ft., and is believed to be the longest of its type yet built. Its span is actually 110 ft. longer than that of the former bridge, and the abutments from which the arch springs are farther back from the waterline at both sides of the river, as well as higher than those of the bridge destroyed five years ago.

The arch of Rainbow Bridge is a double one, consisting of two parallel steel ribs of the closed box type, set 56 ft. 2 in. apart. Each rib is 12 ft. deep and 3 ft. wide, and is suitably strengthened by angle plates and horizontal diaphragms. On top of each rib steel columns or spandrels, also in the form of closed boxes, rise upward to support the steel floor of the crossing itself. The latter stretches across the



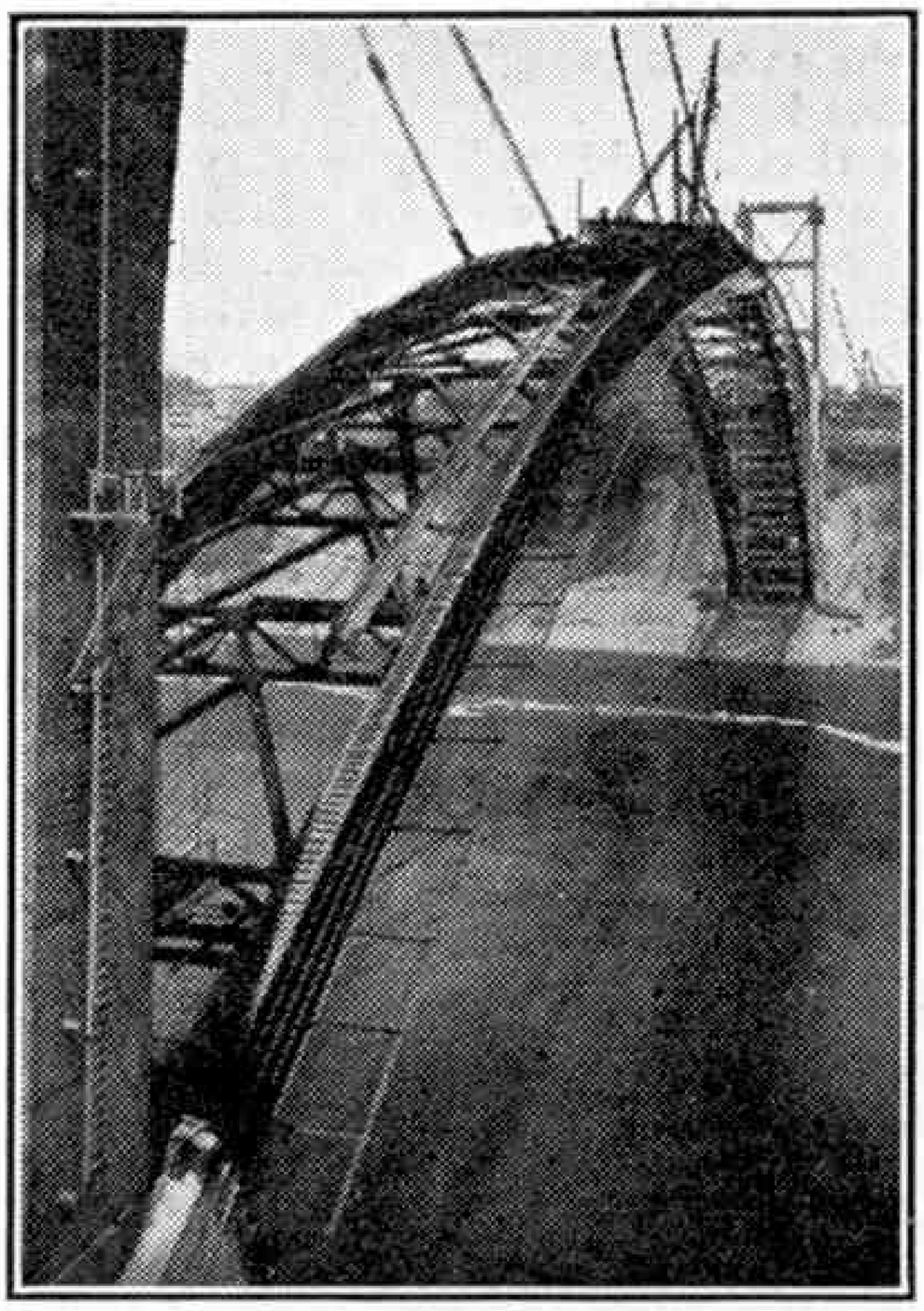
Rainbow Bridge, across the Niagara River 1,700 ft. below the Falls. For the illustrations to this article we are indebted to the courtesy of the Bethlehem Steel Company, Pittsburgh, U.S.A.

river above the crown of the arch, on the level of the crests of the rocky walls of the gorge.

Approach spans in the form of semicircular arches were built to give access to the deck, and the total length of the structure is about 1,440 ft. On the United States side 12 traffic lanes lead to the bridge, and on the Canadian side there are 14 of these. Toll booths placed at convenient points deal with the streams of motor traffic that make use of the crossing.

Bridging a deep and swift river such as the Niagara is not an easy task, for it is impossible to erect false-work to support the structure during its construction. The steelwork had to be erected piece by piece from the ends, and the only way in which it could be held in position until the arch was closed was by tying it back with cables. These were placed in position as each section was completed, and carried back over steel towers on each bank to immense blocks of concrete, each weighing 650 tons and embedded in the solid rock. The towers rose to a height of 129 ft. above the arch spans. They were made up of steel members that later were used to form parts of the bridge. A cross member held the two columns of each tower 60 ft. apart and wire cables stretching landward tied the towers back to the anchorages.

The first step in building the bridge was to erect the semicircular approach arches on the ends of which these steel towers were erected. At the foot of these were the skew-backs, the heavy supports from which the arch springs. There are two of these on each side, one for each rib, and each weighs 46 tons. They rest upon steel grillages weighing 63 tons, each fixed to the concrete foundations by means of huge steel bolts 32 ft. long and 3 ft. in diameter. The concrete abutments are set in excavations made in the solid rock of the walls of the gorge, which therefore take the immense thrust of the arch.



The completed arch ribs of Rainbow Bridge, as seen from the United States end.

The rib sections that had to be handled in erecting the bridge were of various weights from 39 tons to 75 tons. These and the parts of the skewbacks and grillages were raised or lowered into position with the aid of powerful cranes, of which two were used at each end of the bridge. Both were travelling cranes. One, a 40-ton stiff leg derrick, was designed to move along the arch, and to erect steel in front of it as it advanced. The other advanced along the deck of the bridge and was of 85 tons capacity.

In building the arch the first three sections of each rib were constructed outward from the skew-back and grillage, and then eight cables were attached to the outer end of the assembly. These were passed back over the supporting towers to their concrete anchorages to take up the weight of the structure. Then the travelling crane was moved forward to build up two more sections, and when these had been assembled eight further supporting cables were placed in position. So the process of assembly went on, the steel arch ribs being built farther and farther out from the shore and the necessary cables being attached to take up the increasing strain.

As the structure approached mid-stream from each side groups of cables were attached to the free ends from time to time, and towards the end of this stage of construction only half-ribs were built outward. Finally the two sections of each rib were within about a foot of each other, and powerful hydraulic jacks were brought into use to spread them apart and to ensure that they were in compression. The gap remaining was then accurately measured, and the steelwork required to close it was constructed in the shops and placed in position. The opening that was closed in this manner after setting the arch members in compression was 11 in. across.

The ribs were then *(Continued on page 338)*

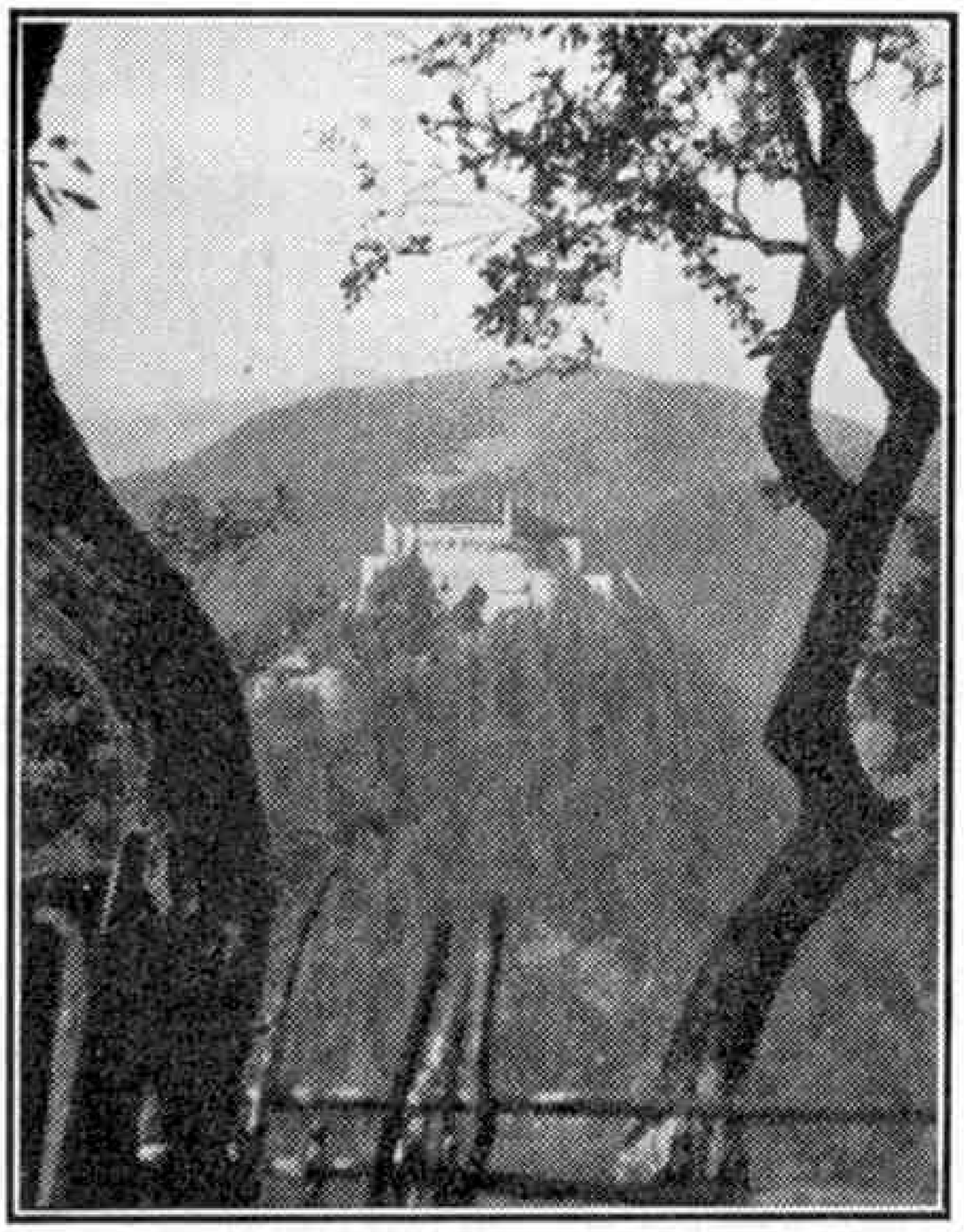
Photography

Autumn Picture-Making

AUTUMN brings with it an interesting variety of photographic subjects. It is in many respects the best time of year for cloud-and-landscape pictures or pictures of clouds alone. The more or less placid skies of summer begin to give place to wilder formations, and any morning or evening may produce a cloudscape that is well worth recording.

Many of the garden flowers of autumn make splendid pictures and are not difficult to deal with. Suitable groups should be watched carefully until they reach their full perfection, a note being made of the time of day when the light is most effective. Among these flowers may be mentioned chrysanthemums, dahlias, asters and Michaelmas daisies, all of which, in addition to forming beautiful outdoor groups, make very attractive pictures when cut and arranged in a vase. For the latter purpose I have found it a good scheme to "plant" the flowers in damp sand in the vase. They will then stay firmly in position while the vase is being moved about to get the best light.

The number of flowers that should be used in a vase depends upon their size. Small flowers generally look best in a fairly close cluster. With large ones, on the other hand, it is best to pick only a few of the best blooms and arrange them carefully to show their individual beauty—in other words make "portraits" of them. In any case each picture should include only flowers of one type. A vase crammed with a miscellaneous variety of different flowers may look very pretty to the eye, but it seldom makes an effective photograph.

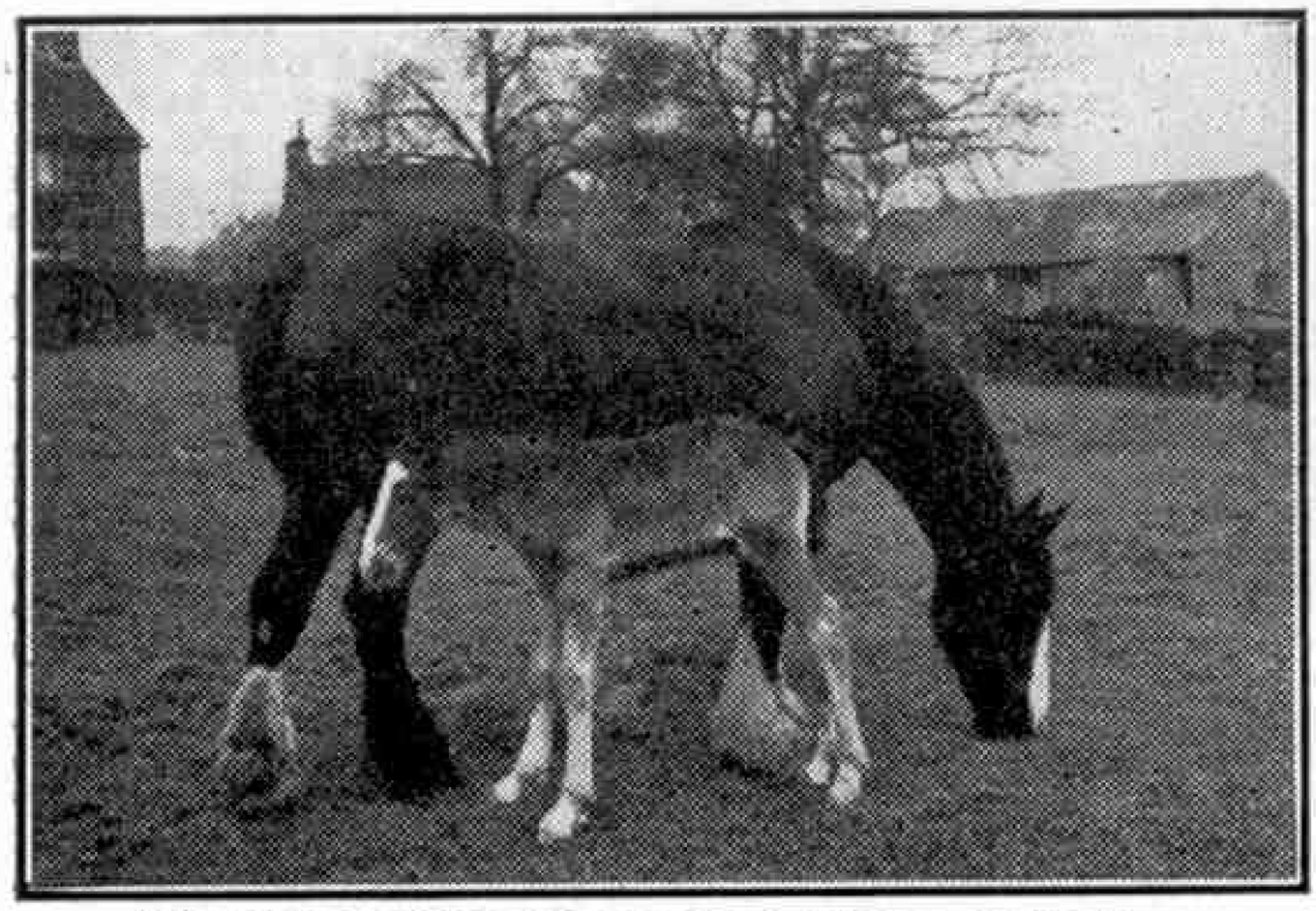


Werfen Castle, Austria. Photograph by Eric H. Coles, London W.11.

A background of some kind is usually necessary and this may consist of a sheet of white or grey paper pinned to cardboard. Blotting paper is useful for this purpose. Tinted papers often give good results, and striking effects may be got with a perfectly black material such as black velvet.

Spiders are very plentiful at this time, and their webs make good subjects when covered with tiny drops of dew or with hoar frost. To get these pictures means of course early rising, for the sun soon spoils the effect. A still morning should be chosen, as even a slight wind makes the web vibrate so that a sharp picture is difficult or impossible to make.

Apart from special subjects of this kind, autumn landscapes have a characteristic beauty of their own. Unfortunately much of this beauty is beyond the scope of the camera, but nevertheless a good deal of the autumn "atmosphere" can be reproduced. It is an interesting experiment to make in autumn a picture of a scene that was photographed earlier in the year.



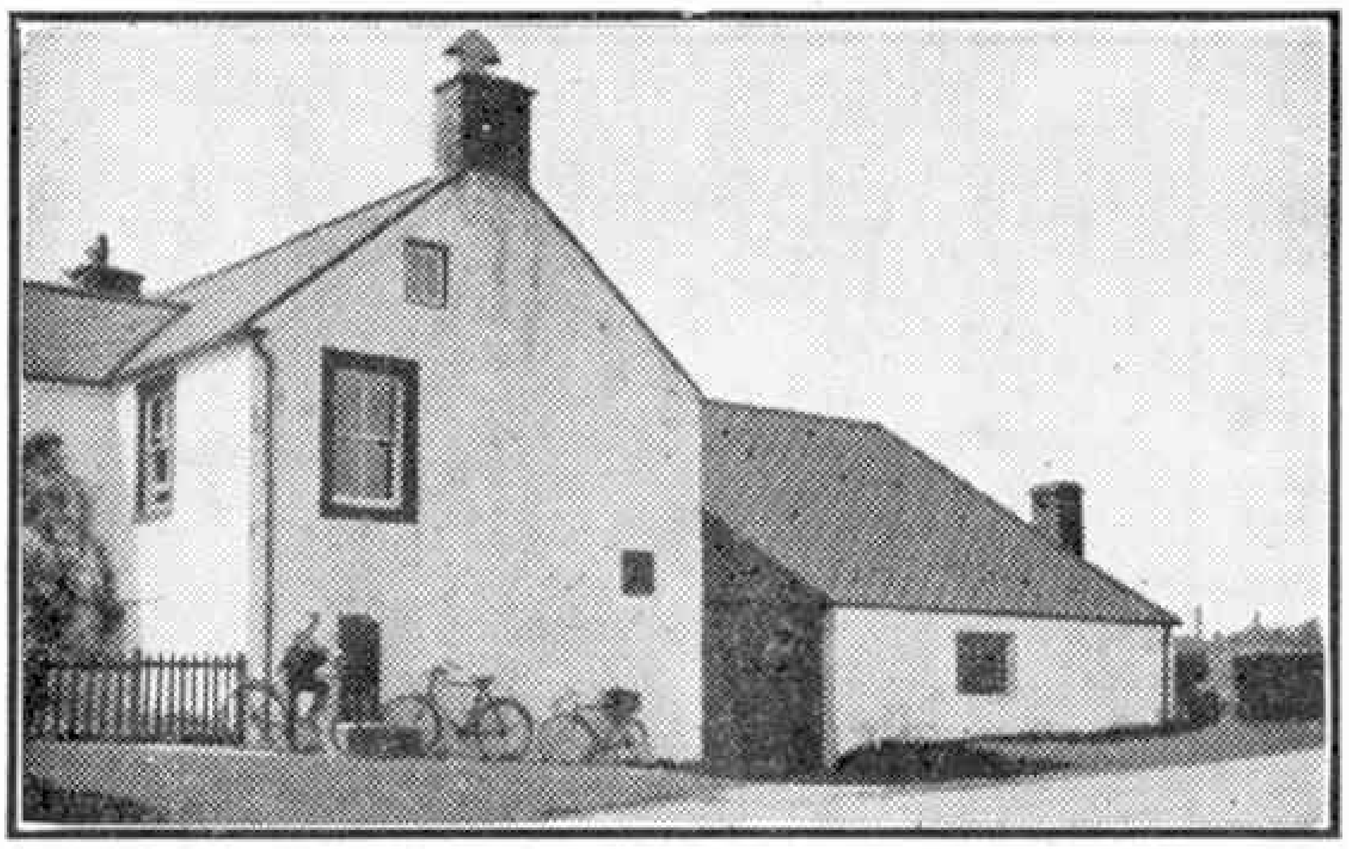
"Contentment." Photograph by J. Taylor, Bradford.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

THE INVENTOR OF THE BICYCLE

Kirkpatrick Macmillan, a Dumfriesshire smith, was the first man to fit propelling gear to a two-wheeled vehicle so that it could be ridden without the feet touching the ground. Until he did this the only two-wheeled machine in use had been the velocipede. The two wheels of this were in line, and its rider sat astride a connecting bar, driving himself forward by thrusting with alternate feet on the ground from time to time.



Courthill Smithy, Dumfriesshire, where Kirkpatrick Macmillan made the first bicycle about 1840. Photograph by H. Briercliffe, Glasgow W.

Macmillan was born in 1813 at Keir Mill, some 12 miles north-west of Dumfries. About 1840 he fitted a velocipede with horizontally-rocking pedals, which passed motion to the rear wheel by swinging rods and cranks. He made his rear wheel 40 in. in diameter to secure a higher gear, while his front wheel was 32 in. in diameter. Both wheels were of wood, including the spokes, and they had iron band tyres that were shrunk on after beating.

Macmillan's machine surprised the local people, and its maker, who was a clever craftsman, not only at his own trade of smith, was regarded as "daft." In1842 he was fined five shillings at Glasgow for obstructing the passage with his bicycle and for knocking down a child. It was reported that he travelled from Old Cumnock to Glasgow, a distance of 40 miles, in five hours. The smithy at Courthill, near Keir Mill, where he made the first bicycle, still stands, and bears a plaque commemorating the invention.

H. Briercliffe (Glasgow 4).

FROM FORTRESS TO CHURCH

The old church of Reculver was built in the 6th century as a Roman fortress. It began with the old Roman wall and fort, and it has twin towers, known as the Two Sisters, which were purchased by the Trinity Board to serve as a landmark to mariners out at sea. These old towers have the appearance of being of Roman origin, and this impression is strengthened when they are entered. In the western tower there is a very old spiral staircase by which the first floor of the tower is reached, and rickety wooden ladders lead to two other floors. A magnificent view of the surrounding country is obtained from the windows.

The church is far away from any busy centre, and has very few visitors, but there still remains the old notice board, with notices giving the times of services and other local announcements.

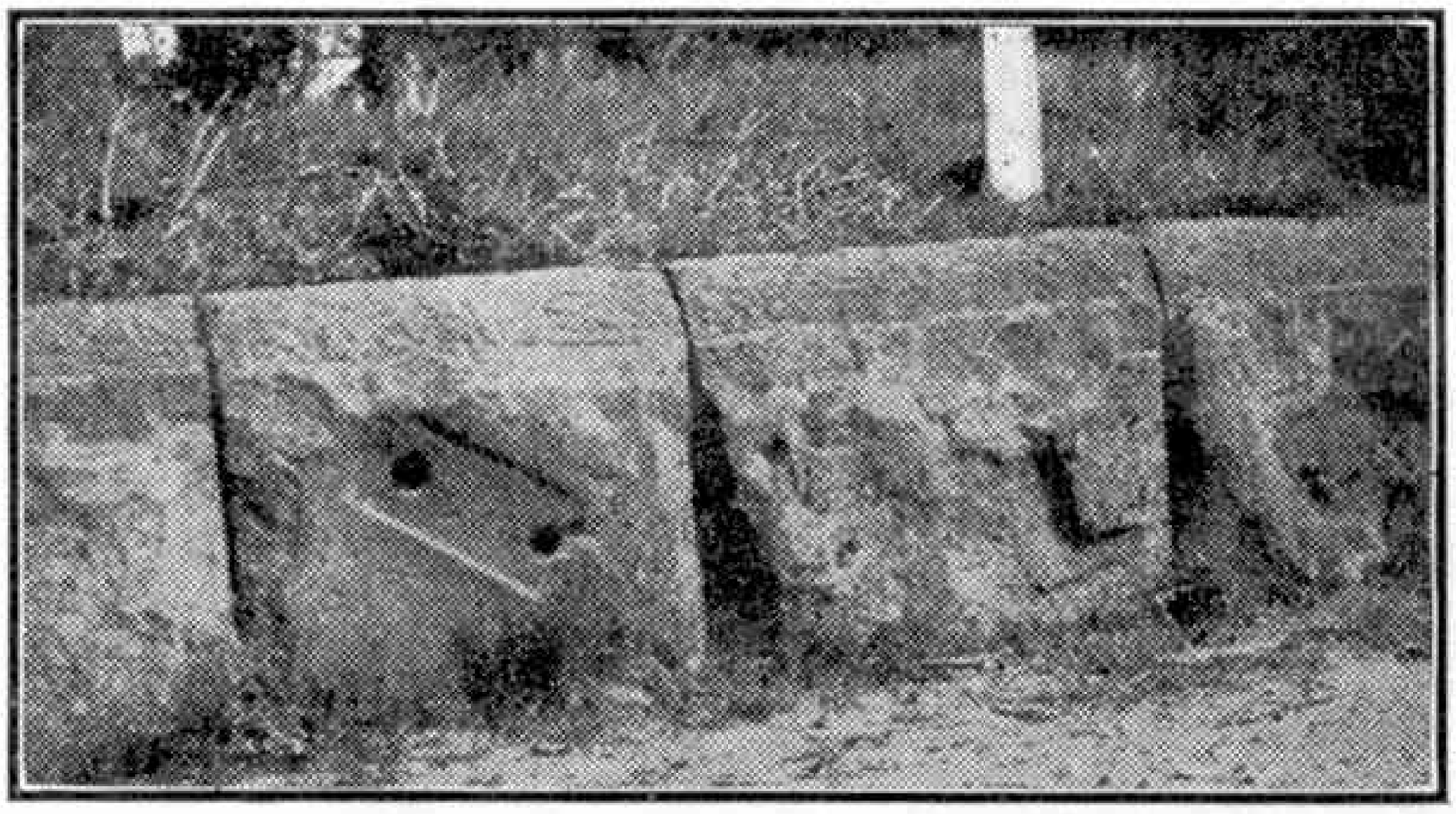
Helen Thompson (Tilehurst).

LIVERPOOL RAILWAY RELICS

A recent "*From Our Readers*" article described the first offices in Crown St., Liverpool, of the Liverpool and Manchester Railway. Another of Liverpool's railway relics is to be found in an unexpected place. This is a low stone wall built around a small plantation at "Court Hey," Roby. Roby is on the line of this famous pioneer railway, about five miles from its Liverpool end, and the wall was built with some of its original stone sleepers.

Records tell us that 18 miles of track were laid on stone and the other 14 miles on oak sleepers, the latter being used on embankments. The stones were square blocks measuring about 2 ft. each way, and they were about 1 ft. thick. They were 3 ft. apart along the lines of rails, and were so placed that the chairs were fitted along the diagonals, as can be seen from the photograph of part of the wall reproduced on this page. It is said that a bed was prepared for each block by lifting and dropping it a few times. Wooden pegs were used to fasten the chairs in position, but this did not give a satisfactory track, and eventually the blocks were replaced by larch sleepers.

As our illustration shows, the blocks were set up on one side when built into the wall. The top of each was "dressed" to give a level surface and a pleasing appearance, but the marks where the chairs were fastened are still clearly visible on most of them. The rails first used were fish-bellied, weighing 35 lb. to the yard, and were soon found too light.



Part of a wall built of stone sleepers from the original Liverpool and Manchester Railway. Photograph by W. Wyatt, Liverpool.

W. Wyatt (Liverpool).

Suggestions Section

By "Spanner"

(560) Useful Compasses and Dividers

("Spanner")

The Meccano Drift has many useful applications in addition to its uses in ordinary model-building, and we have described some of these in the "*M.M.*" from time to time. This month we mention still further applications for this part, which are illustrated in Fig. 560, where it is shown incorporated in a set of compasses and dividers. To construct the dividers two Drifts are inserted in Rod and Strip Connectors, which are bent slightly and bolted to a Hinge that is spring loaded by a Spring Clip. The lugs of the Spring Clip are gripped by the bolts. The distance between the legs is controlled by a screw adjustment, which consists of a 2" Screwed Rod fixed at one end in a Collar. The latter is lock-nutted by means of a $\frac{7}{32}$" Grub Screw to an Aeroplane Collar secured on the Drift, the Rod passing through a second Collar similarly attached to the second Drift and carrying a Threaded Boss on its protruding end.

The construction of the compasses is similar, except that the pencil leg is formed from a 2" Rod, the lower end of which is fitted with a Rod Socket. An End Bearing is fastened by its tapped bore to the Rod Socket, and its lugs are opened out slightly to grip a pencil, which is held in place by means of a $\frac{3}{8}$" Bolt and Nut.

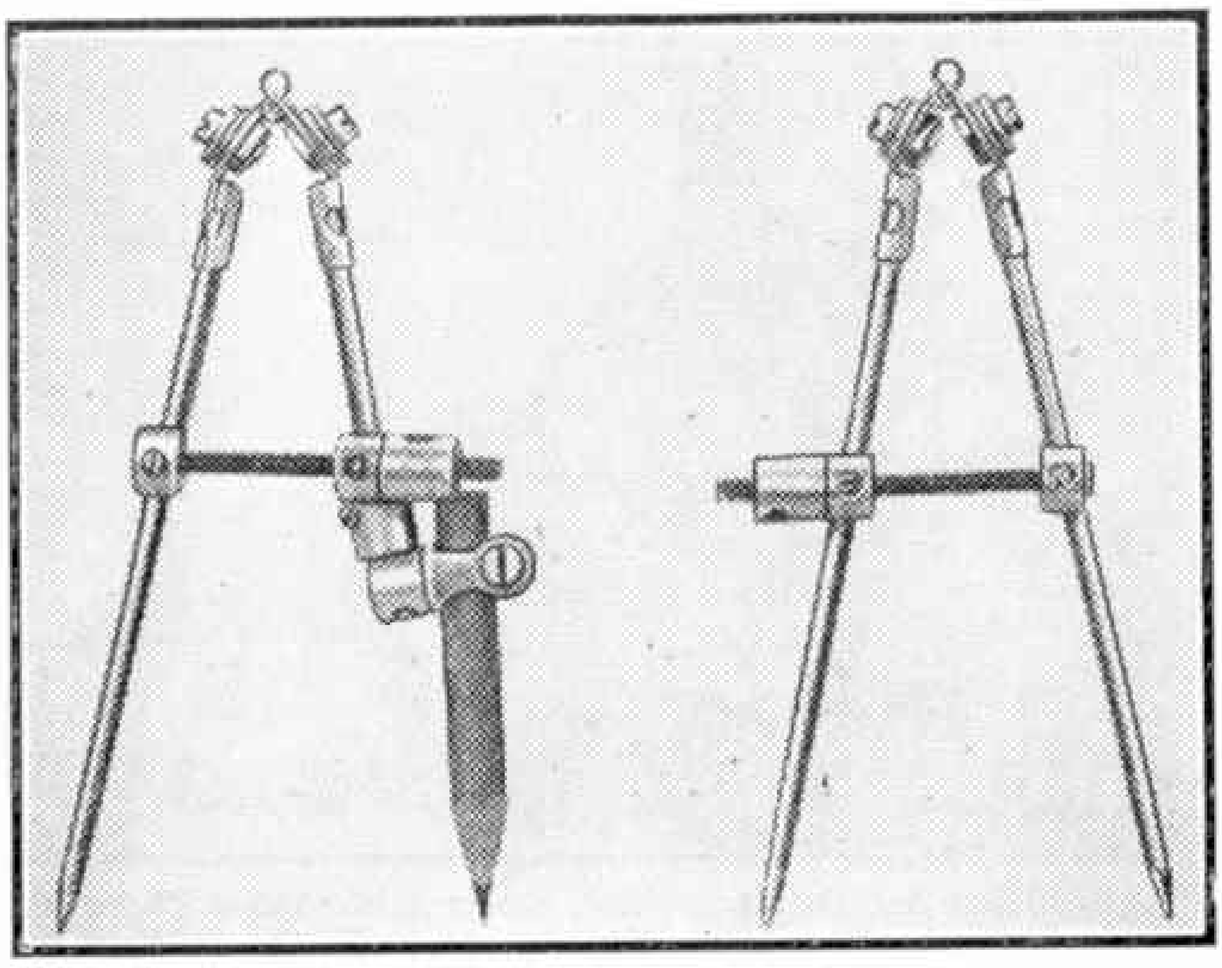


Fig. 560.

(561) Smooth Movement Cam

("Spanner")

The cam disc consists of a $1\frac{1}{2}$" Pulley attached by one nut and bolt to a Face Plate. The Rod carrying this Face Plate is journalled in one of the holes of a vertical Flanged Plate, and also in the boss of a Double Arm Crank. The end of the Rod extends about $\frac{1}{8}$" beyond the boss of the Face Plate and passes into a hole of the $1\frac{1}{2}$" Pulley, which is thus prevented from turning on its one retaining bolt.

The tappet is represented by a $4\frac{1}{2}$" Strip carrying at its pivoted end a Crank. A Pivot Bolt passes through this Crank and is locked to the vertical Plate by means of two nuts. As will be seen from Fig. 561, the edge of the tappet rests in the groove of the $1\frac{1}{2}$" Pulley, the cam movement being transmitted to the desired point by a Strip pivotally attached to the tappet as shown.

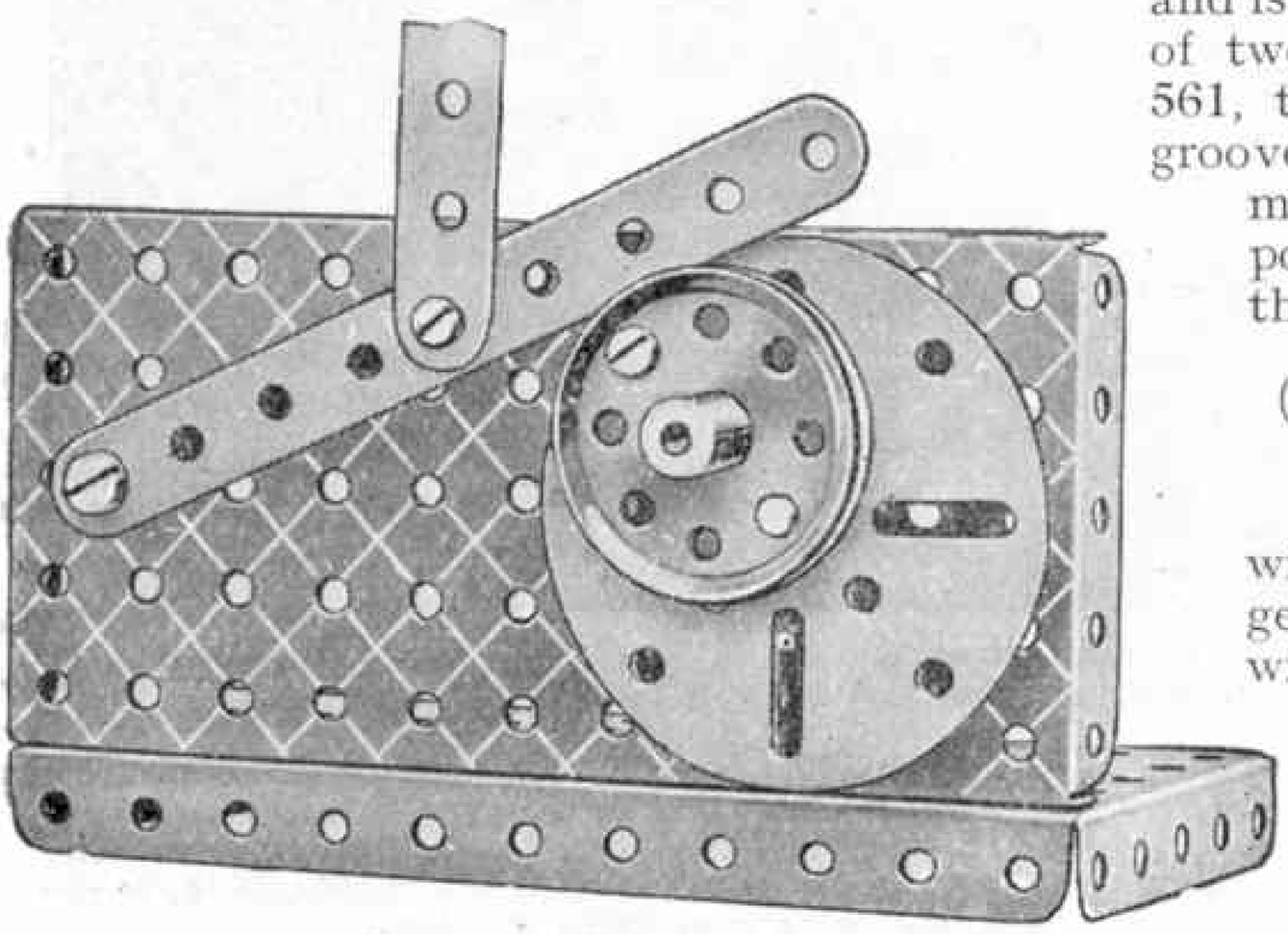


Fig. 561.

(562) Sun and Planet Winding Gear

("Spanner")

Fig. 562 shows a novel gear-box with which it is possible to obtain a gear reduction ratio of 2:1 between a winding handle and a driven shaft 1, while the latter forms the centre about which the handle turns.

The shaft 1 is free to turn in a 1" Gear 2, which is secured to the framework by a Bolt passed through an Angle Bracket 3 and

inserted in the threaded bore in the boss. The Bolt is secured by a nut beneath the Angle Bracket, and must be spaced by Washers to clear the shaft 1. A second 1″ Gear 4 engages with Gear 2, and is fixed to a 1½″ Rod 5 journalled in 2″ Strips 6, which are free to turn about the shaft 1. Washers are placed between the inner 2″ Strip and the Gears 2 and 4 for spacing purposes. The Rod 5 carries a ¾″ Pinion 7 engaging with a 50-teeth Gear 8 secured to the shaft 1. The 2″ Screwed Rod 9 holds the Strips 6 in position, and is fitted with a Coupling 10 to form the handle.

(563) Independent Front Wheel Suspension

(D. Southin, Isle of Wight)

The high speed of modern road vehicles and the demand for greater comfort in travelling has necessitated improvements in the springing of the chassis, and many ingenious systems of suspension have been introduced for the purpose. One of these is shown in model form in Fig. 563. In this each of the front wheels is sprung independently of the other, in order to compensate for irregularities in the road surface.

The device consists of an arm 1, which is free to rotate and is pivotally connected to a 2″ Rod supported in a Trunnion bolted to the chassis. A Coupling 2 is fixed on this Rod and is spring-actuated by a Compression Spring 3 mounted on the Rod between the Coupling and the Trunnion. A Collar on the upper end of the Rod is used to adjust the tension of the Spring.

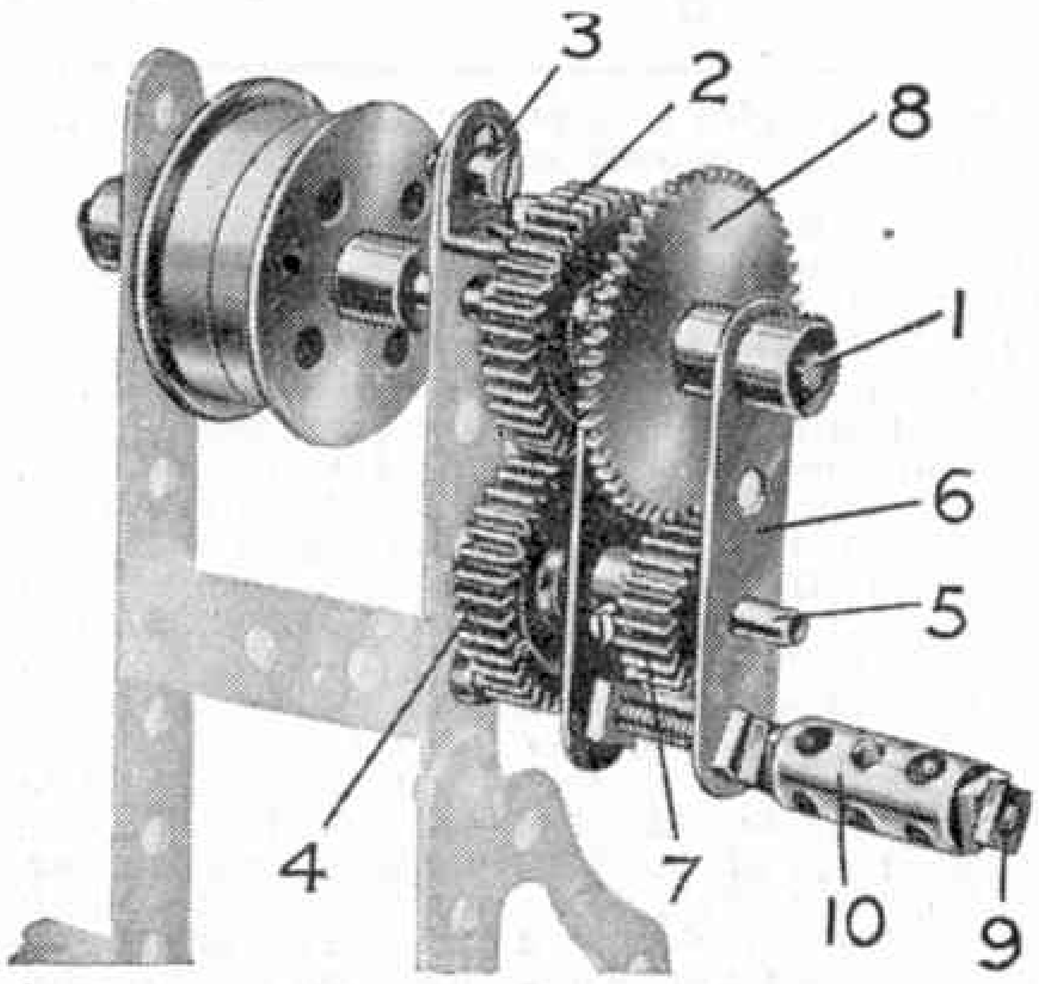


Fig. 562.

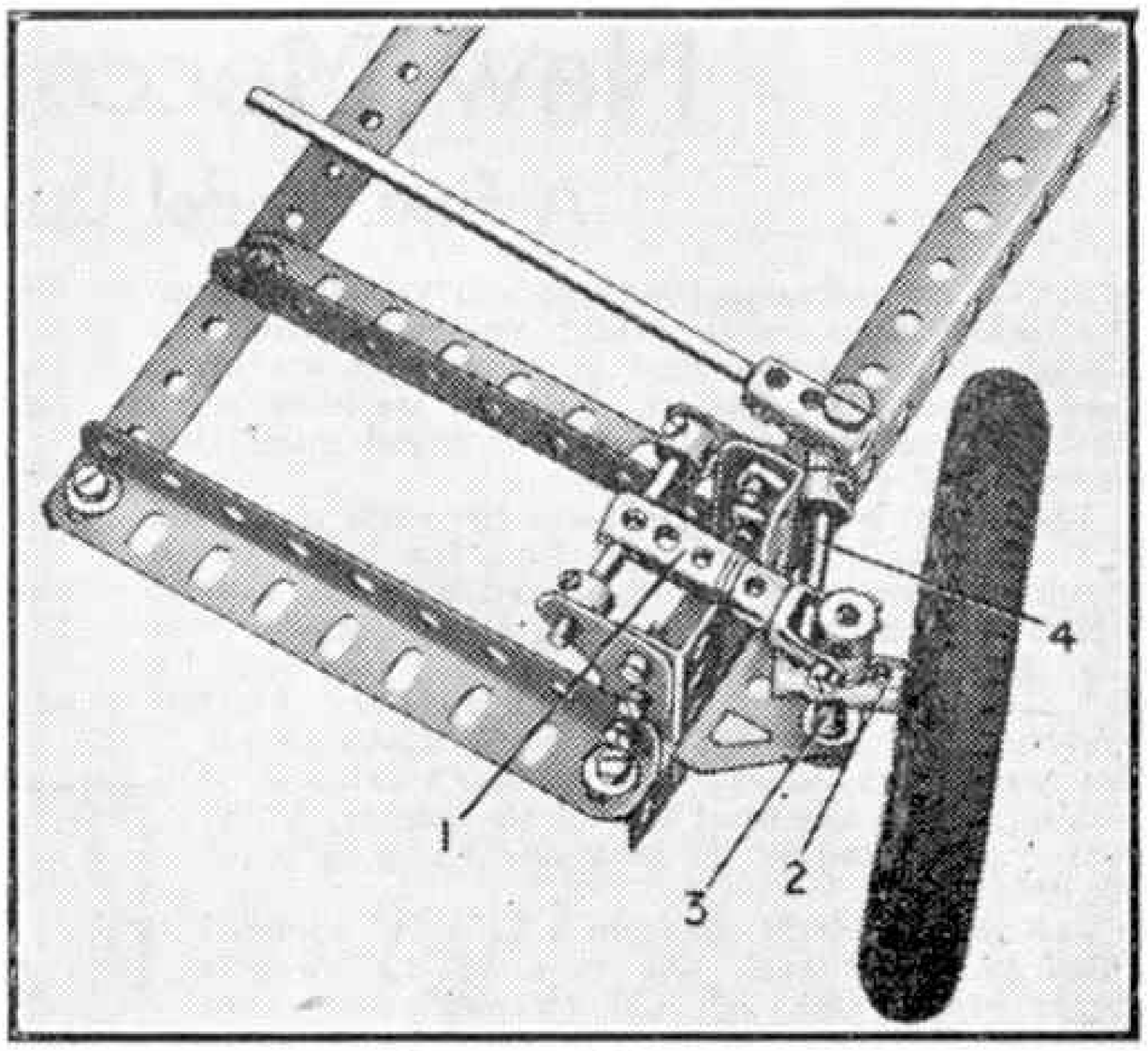


Fig. 563.

The radius arm 4, also a 2″ Rod, is fixed to the inner tapped bore of the Coupling 2, and a Collar mounted on it is lock-nutted by means of a Pivot Bolt to a Coupling holding the track Rod. The Collar is held between two further Collars that are fixed to the arm.

The stub axle is 1″ long, and is gripped in the outer transverse bore of the Coupling 2. It carries a 3″ Pulley shod with a Motor Tyre, which is mounted freely on it and is held in place by a Collar.

(564) A Useful Sandpaper Block

(G. Thompson, Birmingham)

A sandpaper block is a useful addition to any tool kit, and it is quite easy to make one from Meccano parts. A 3½″×2½″ Flanged Plate and two 5½″ Strips are the only parts required. A piece of sandpaper is placed over the face of the Plate, and turned over the flanges at each end. It is then held in place by means of the Strips, which are sprung in between the flanges. The arched Strips make an excellent handle.

(565) A Large Crown Wheel

(R. Hughes, Bristol)

There are not many occasions when a large crown or contrate wheel is necessary, but when the need does arise it is useful to know that one can be made from a Face Plate and some Rack Strips. The Rack Strips must be bent to the radius of the Face Plate, to which they are then secured by means of Angle Brackets. If a contrate wheel of even larger size is required it may be built up by bolting the Rack Strips to a Hub Disc.

New Meccano Model

A Fine Model Dockside Crane

THEIR attractive mechanisms and variety in construction make cranes excellent subjects for Meccano models. Some of the most popular types are those used in dockyards, and on this page we illustrate a model of one of these that will be found interesting to build and efficient in operation.

The model is constructed from the parts contained in Outfit No. 7, and is driven by a No. 2 Clockwork Motor. Construction is commenced with the gantry, which consists of a built-up girder 1 formed from 12½" Angle Girders lengthened at their rear ends by 5½" Strips and bolted to Strip Plates and Flexible Plates. A ½" loose Pulley, around which passes the cord for traversing the observer's cabin 2, is lock-nutted to the front end of the gantry, which is then completed by the attachment of a 2½" × 1½" Flexible Plate.

The cabin is built up from a 2½" × 1½" Flanged Plate joined at each side to a 2½" × ½" Double Angle Strip. One 2½" and two 3½" Strips are attached to each of these, the latter Strips being fixed at their rear ends to 1" × 1" Angle Brackets bolted to a Trunnion. A second Trunnion is attached to the lower flange of the Flanged Plate. The cabin travels on the lower flanges of the girder 1, on rollers formed from Collars, which are attached to ½" Reversed Angle Brackets bolted to it, and its movement is controlled by turning a 2" Pulley 3 mounted on the lower end of a 5" Rod journalled in the rear end of the gantry. A 3½" × 2½" Flanged Plate, lengthened half an inch by a 2½" × 2½" Flexible Plate, is bolted to the end of the gantry.

The platform carrying the operator's cab is situated above the gantry, and is formed from a 5½" × 2½" Flanged Plate bolted to a 5½" × 2½" Flexible Plate. It is spaced from the top of the gantry by 2½" × ½" Double Angle Strips, to which are bolted two 5½" × 2½" and two 4½" × 2½" Flexible Plates. A 2½" × 2½" Flexible Plate is bolted to the front of this Plate. The cab pivots on a 6½" Rod inserted in a 3" Pulley 4 and a Double Bent Strip bolted to the platform.

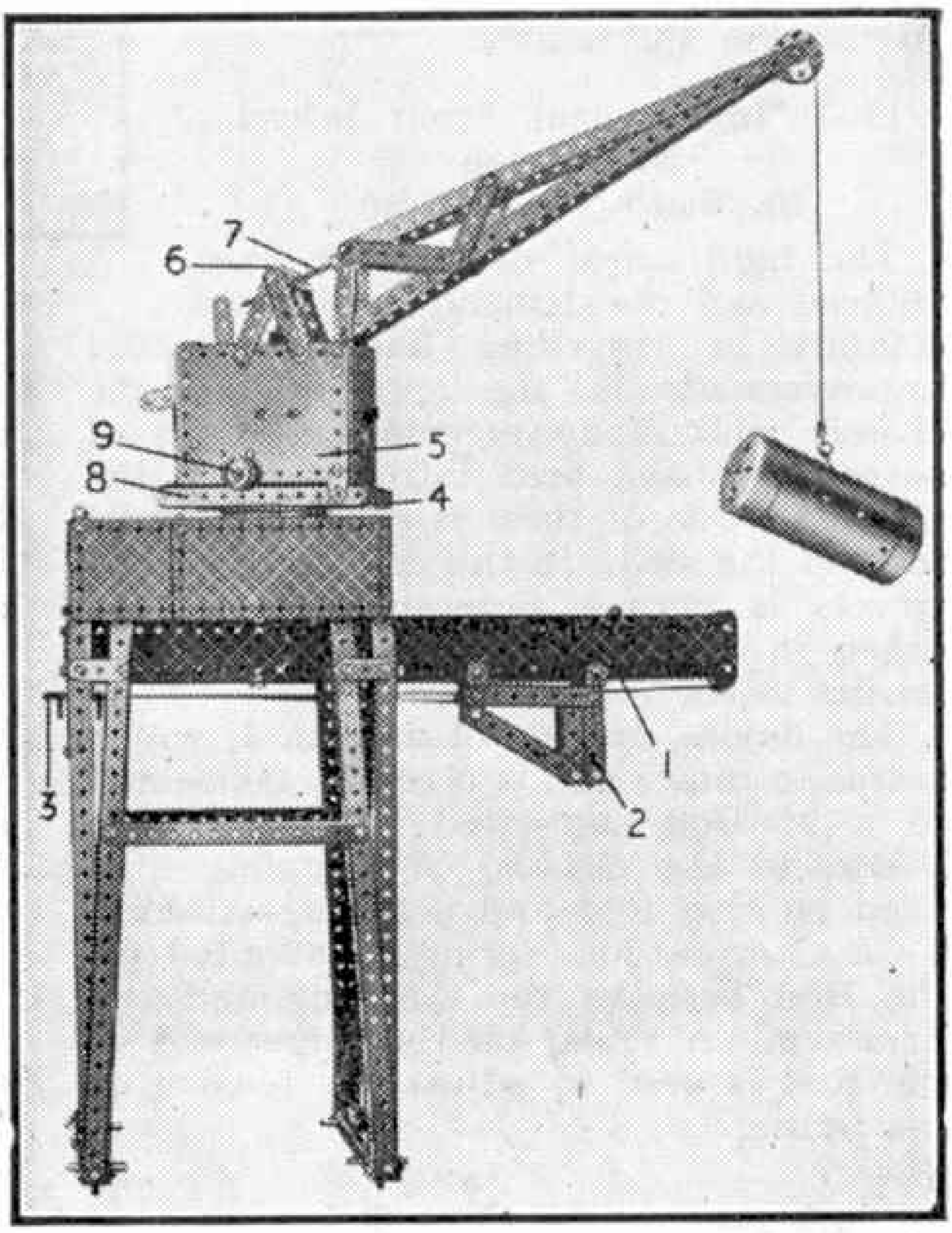
The legs on which the gantry and platform are mounted are built up as shown, the rear pair being attached by means of two Semi-Circular Plates. The travelling wheels are 1" Pulleys shod with Rubber Rings mounted on 1½" Rods at the lower ends of the legs.

The operator's cab is built around a No. 2 Clockwork Motor 5 that is attached at its front end to a 3½" × 2½" Flanged Plate by a 2½" × ½" Double Angle Strip and ½" × ½" Angle Brackets. A second side for the cab is formed by two halves of a Hinged Flat Plate.

Construction of the jib is clear from the illustration, and it is raised and lowered by turning a Bush Wheel 6, to the face of which is bolted a Coupling. This unit is screwed on a 3" Screwed Rod 7 passed through the centre hole of a 2½" × ½" Double Angle Strip lock-nutted to 2½" Strips at the sides of the cab. This Screwed Rod is inserted in the boss of a large Fork Piece pivoted on a 2" Rod mounted in the jib.

The roof of the cab can now be fitted in place. It consists of two 2½" × 1½" Flexible Plates fixed to the Motor sideplates by a 2½" × ½" Double Angle Strip. A Crank and a ½" × ½" Angle Bracket are bolted to the roof and Motor sideplate to provide a bearing for the Rod secured in Pulley 4. The drive is transmitted to the model from the driving shaft of the Motor by extending the shaft with a 1" Rod, and connecting this by a Driving Band to a 1" Pulley mounted on the 4" Rod forming the hoisting drum. This Rod is journalled in the Flanged Plate at the front of the cab and a 1" × 1" Angle Bracket bolted to the Motor sideplates. A length of Cord is tied to a Cord Anchoring Spring mounted on the Rod, passed through a hole in the roof of the cab and over the jib-head pulley, and finally fastened to a Small Loaded Hook.

The cab is now mounted on a 5½" × 2½" Flanged Plate 8 and placed in position on the platform of the crane. It can be swivelled by turning a ¾" Flanged Wheel 9 mounted on a 3½" Rod journalled in its sides. This Rod carries a Worm meshed with a ½" Pinion fixed on the Rod of Pulley 4. The structure of the cab is completed by means of a 2½" × 1½" and a 2½" × 2½" Flexible Plate, which are attached to the rear end of the cab and to the Plate 8.



This fine crane, which is driven by a No. 2 Clockwork Motor, is easy to build and works splendidly.

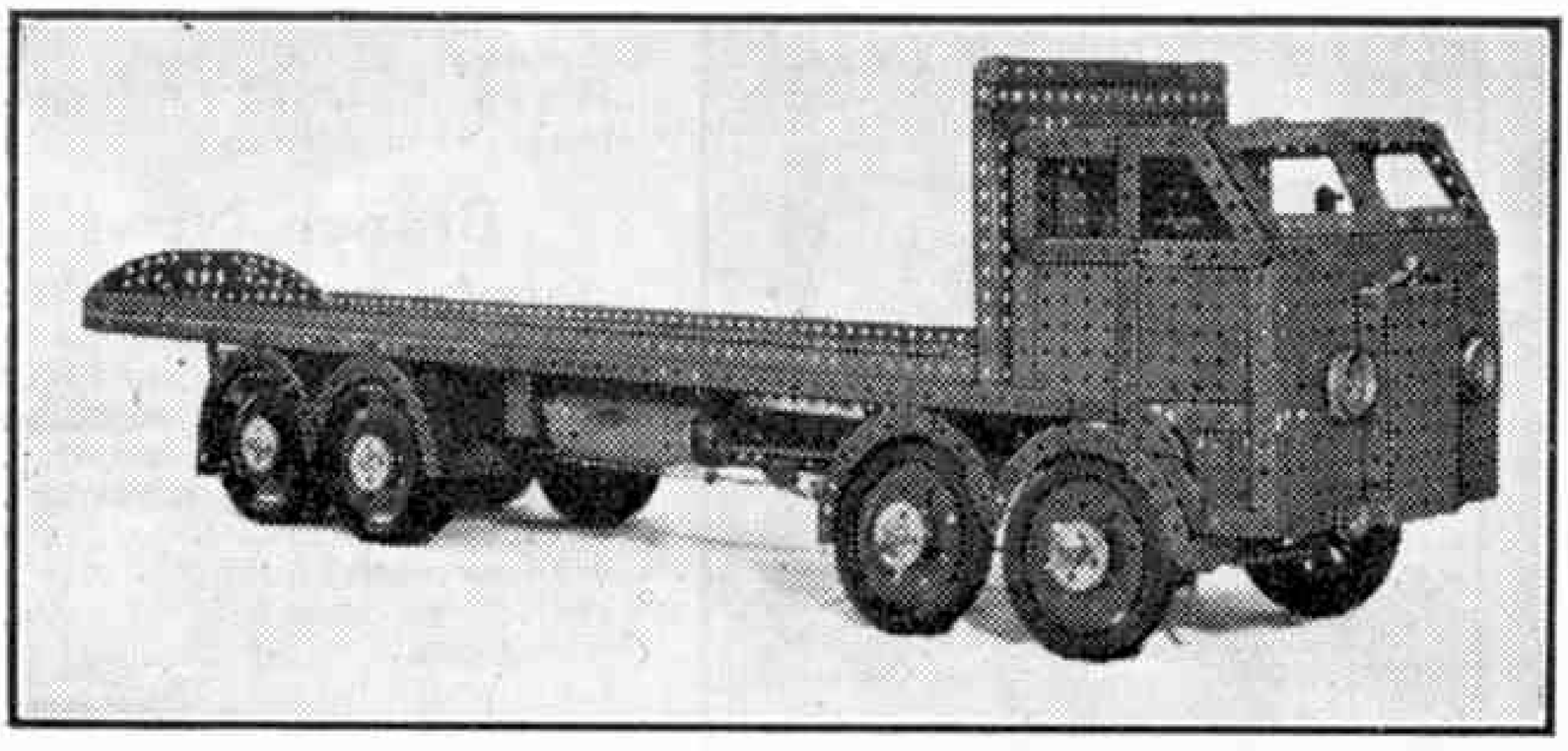
Parts required to build model Dockside Crane: 12 of No. 1; 16 of No. 2; 6 of No. 3; 2 of No. 4; 10 of No. 5; 4 of No. 6a; 8 of No. 8; 9 of No. 10; 4 of No. 11; 18 of No. 12; 4 of No. 12a; 1 of No. 14; 1 of No. 15; 1 of No. 15b; 1 of No. 16; 2 of No. 17; 4 of No. 18a; 1 of No. 18b; 1 of No. 19b; 1 of No. 20a; 1 of No. 20b; 5 of No. 22; 1 of No. 22a; 1 of No. 23; 1 of No. 24; 1 of No. 26; 1 of No. 32; 12 of No. 35; 162 of No. 37a; 144 of No. 37b; 21 of No. 38; 1 of No. 40; 1 of No. 45; 2 of No. 48; 9 of No. 48a; 1 of No. 51; 2 of No. 52; 2 of No. 53; 1 of No. 57c; 6 of No. 59; 1 of No. 62; 1 of No. 63; 1 of No. 80c; 2 of No. 90; 4 of No. 90a; 2 of No. 111; 2 of No. 111a; 6 of No. 111c; 2 of No. 115; 1 of No. 116; 4 of No. 125; 2 of No. 126; 4 of No. 155a; 1 of No. 162; 1 of No. 176; 1 of No. 186; 6 of No. 188; 6 of No. 189; 3 of No. 190; 1 of No. 191; 1 of No. 192; 2 of No. 197; 1 of No. 198; 1 of No. 213; 2 of No. 214; 8 of No. 215; 2 of No. 217a; 1 No. 2 Clockwork Motor (not included in Outfit).

Meccano Model-Building Competitions

By "Spanner"

September Model-Building Contest

This is the time of the year when model-builders begin to devote more time to indoor occupations, and many of them set to work to build reproductions of interesting structures or machines that they have seen during their outdoor rambles of the past few months. Our competition this month will give them opportunities of winning fine prizes for their efforts.



A powerful twelve-wheeler transport lorry which won a prize for D. M. Gunn, Timperley, in a recent "M.M." General Model-building competition.

Every reader of the *"M.M."* can enter for this splendid contest. The entries received will be grouped in two sections, one for competitors over 15 years of age, and the other for competitors age 15 or under. The actual models constructed must not be sent, all that is required being a photograph or a good drawing, with sufficient explanation to make everything clear. Each competitor must remember to write his name, age, and address on his entry, and particularly on the back of each photograph, or drawing submitted.

In making their awards the judges will take into account the interest and originality of a model, as well as its construction and the workmanship displayed in building it. Thus a small model will have as good a chance of winning a prize as a large one. The prizes in each section are £2/2/–, £1/1/–, and 10/6 respectively, and consolation prizes of 5/– will be awarded to other good efforts. Entries must be addressed *"September Model-building Competition, Meccano Ltd., Binns Road, Liverpool 13."* Closing date: 31st October.

Christmas Contest Results (Overseas Section)

The Christmas Model-building Contest, which is the most popular contest of its kind owing to the fact that it is arranged when the model-building season has reached its peak, always produces a wide and varied range of models, and the Overseas Section of this year's contest proved no exception to this rule. The results of this Contest, which was announced in the December 1941 issue of the *"M.M.,"* are as follows:

First Prize, Cheque for £2/2/–: C. Petersen, Maylands, W. Australia. 2nd, Cheque for £1/1/–: W. Petersen, W. Australia. 3rd, P.O. for 10/6: Wing Lam Tsun, S. Africa.

Consolation Prizes of 5/–: Clayton Rose, Coleman, Canada. J. Morris, Johannesburg; J. Williams, Vancouver; M. Peters, B. Aires; N. Barker, Christchurch, N.Z.

The First Prize was awarded to C. Petersen, Maylands, for two fine models of a sports car and a mobile anti-aircraft gun respectively. The first model is constructed mainly from Strips and is powered by an E1 or E120 type Electric Motor, one sideplate of which forms the near side of the bonnet, and to which is bolted a Flanged Sector Plate that neatly represents the top. The general appearance of the model is greatly improved by the addition of mudguards formed from Strips and Formed Slotted Strips, and of bumpers sturdily bracketed to the chassis at both back and front. C. Petersen's anti-aircraft gun is mounted on a four-wheeled chassis constructed from Flexible Plates strengthened by Angle Girders, and consists of a metal tube forming the barrel that is attached at its inner end to the breech casing, built up from Angle Girders. Elevation of the gun is carried out by turning a horizontal handle which rotates a Worm meshed with a 57-teeth Gear attached to the barrel. A 1" Pulley secured on the upper end of a vertical Rod journalled in the gun mounting is rotated to swivel the gun, the drive being led from this Rod to the lower race of the bearing on which the mounting is fixed. This lower race is secured to the chassis.

W. Petersen, also of Maylands, received the Second Prize for a realistic model of a light cruiser and a low-wing single-engine fighter aircraft. The cruiser presents a formidable appearance due to its sturdy construction from Strips and Flat Girders, and includes such details as searchlights, pom-pom and anti-aircraft guns, and a range finder consisting of a short Rod gripped in a Handrail Support secured to the superstructure. The novel feature of the second model is the realistic appearance of the fuselage, which is constructed entirely from Strips moulded to the required shape and attached at its rear end to the twin fin and rudder type tail unit, which is neatly represented by Curved Strips bolted to 2½" × 1½" Flexible Plates. The model is fitted with the normal type of fixed undercarriage.

A stately model battleship won Third Prize for W. L. Tsun, Potchefstroom, S. Africa. The model has an overall length of 6½ ft. and includes all the major features of its prototype including the quadruple gun turrets housing the 13" guns.

Club and Branch News

WITH THE SECRETARY

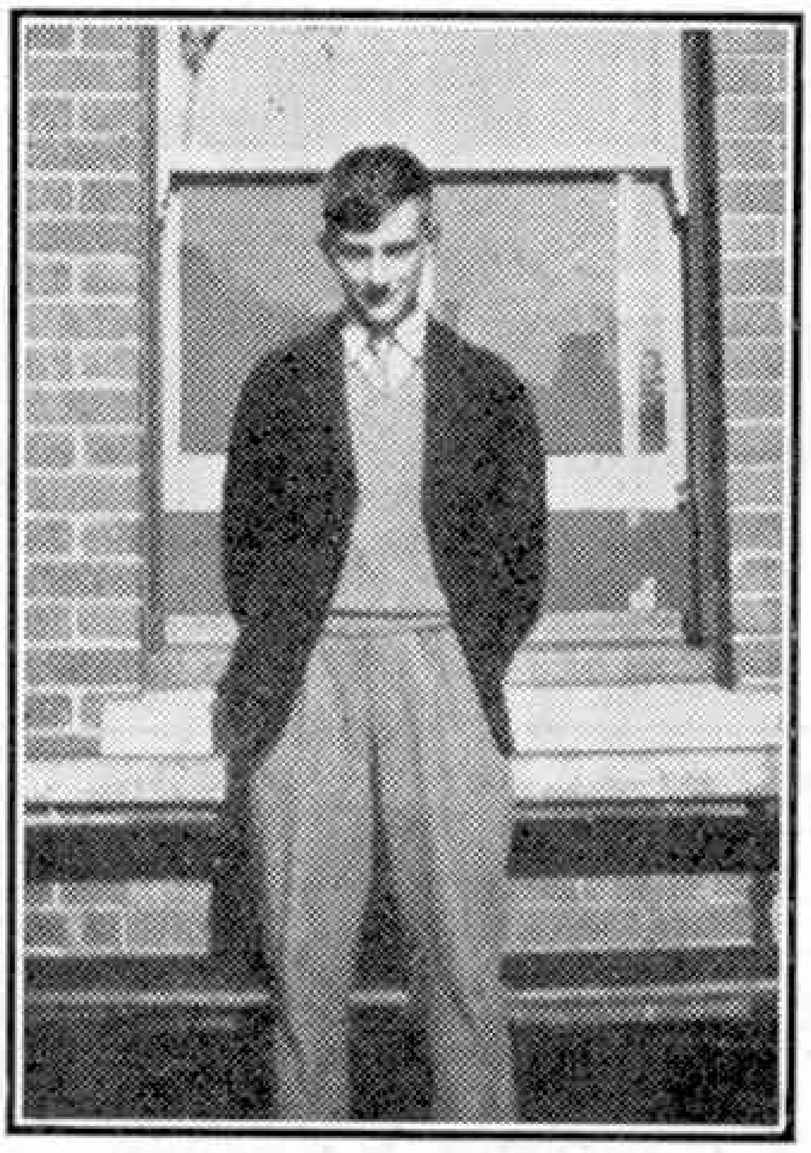
MAKING A FRESH START

September is the month when Clubs and Branches begin again, in the sense that indoor meetings are resumed and model-building and train operations are taken up with renewed enthusiasm. The need for good Club and Branch work is greater this year than ever, and the utmost care should be taken to arrange a really attractive and vigorous programme.

Plan first for jolly model-building meetings. It is best to hold a special meeting to find out what members want to do, whether to build large models together, to construct small ones individually or to have regular model-building contests. Some form of competition is always good, so if regular contests are not arranged, then marks should be awarded for all models built, so that small prizes can be given to those who earn most points during the Session. When the model-building programme has been settled, attention should then be given to lectures, film shows, debates and other diversions, and meetings will be all the jollier for the introduction of games and if possible, refreshments. The aim must be to give all who come to the meetings a comfortable feeling, as well as opportunities for indulging in their valuable hobbies.

A NUTAND BOLT SUGGESTION

One of the greatest needs during the coming winter is to take the utmost care of Meccano parts, for these cannot readily be replaced. Nuts and Bolts are a special difficulty. In one Club this has been met by the collection of small nuts and bolts of any kind that promise to be useful. It is surprising how many of these, especially those designed for electric fittings of various kinds, can be found lying discarded in boxes and drawers in the average home. They may not give the finished appearance and rigidity obtainable with the real thing, but some of them can be used with advantage for holding parts together in certain instances, and it is a good idea to make use of them for internal work, keeping Meccano Nuts and Bolts for outward visible joints.



P. Pascall, secretary of the Totnes M.C. This Club was affiliated in February 1940—and has been noteworthy for the variety and competitive spirit of its programme. "Nuts" and "Bolts," the two sections of the Club, have been keen rivals in model-building, Hornby Train operations and games.

Club Notes

WITHERNSEA M.C.—This Club has now been affiliated under the Leadership of Mr. R. W. Shooter, who is also Leader of the Hornsea M.C. A comfortable room is now occupied and regular Film Shows are being given. These have included "*Atlantic Patrol*" and other M.o.I. films. Cricket also has been played. The Secretary gave a Lecture on "*Electricity*," mechanical experiments have been carried out and a Lecture on "*A.C. Motors*" was illustrated by taking a small motor to pieces so that members could inspect parts. Club roll: 6. *Secretary*: B. Colley, Colley's Camping Ground, Withernsea, E. Yorks.

YORK M.C.—Construction of large and interesting models continues, the latest being a fine dredger. A Film Display also has been given, and the Club's model railway has been used in interesting operations. A variety of smaller models is now being constructed. Club roll: 7. *Secretary*: G. Hodgson, 1, Sunnyside, Heslington Lane, Fulford, York.

SOUTH AFRICA

MALVERN M.C.—The Club recently celebrated its 21st birthday by a party at which parents and former members were present. An enjoyable picnic also was held, and at one meeting a Court of Injustice was organised, fines inflicted on members on various excuses being contributed to the Troops Comforts Funds. *Secretary*: H. A. Trent, P.O. Box 8, Cleveland, Johannesburg, South Africa.

Branch News

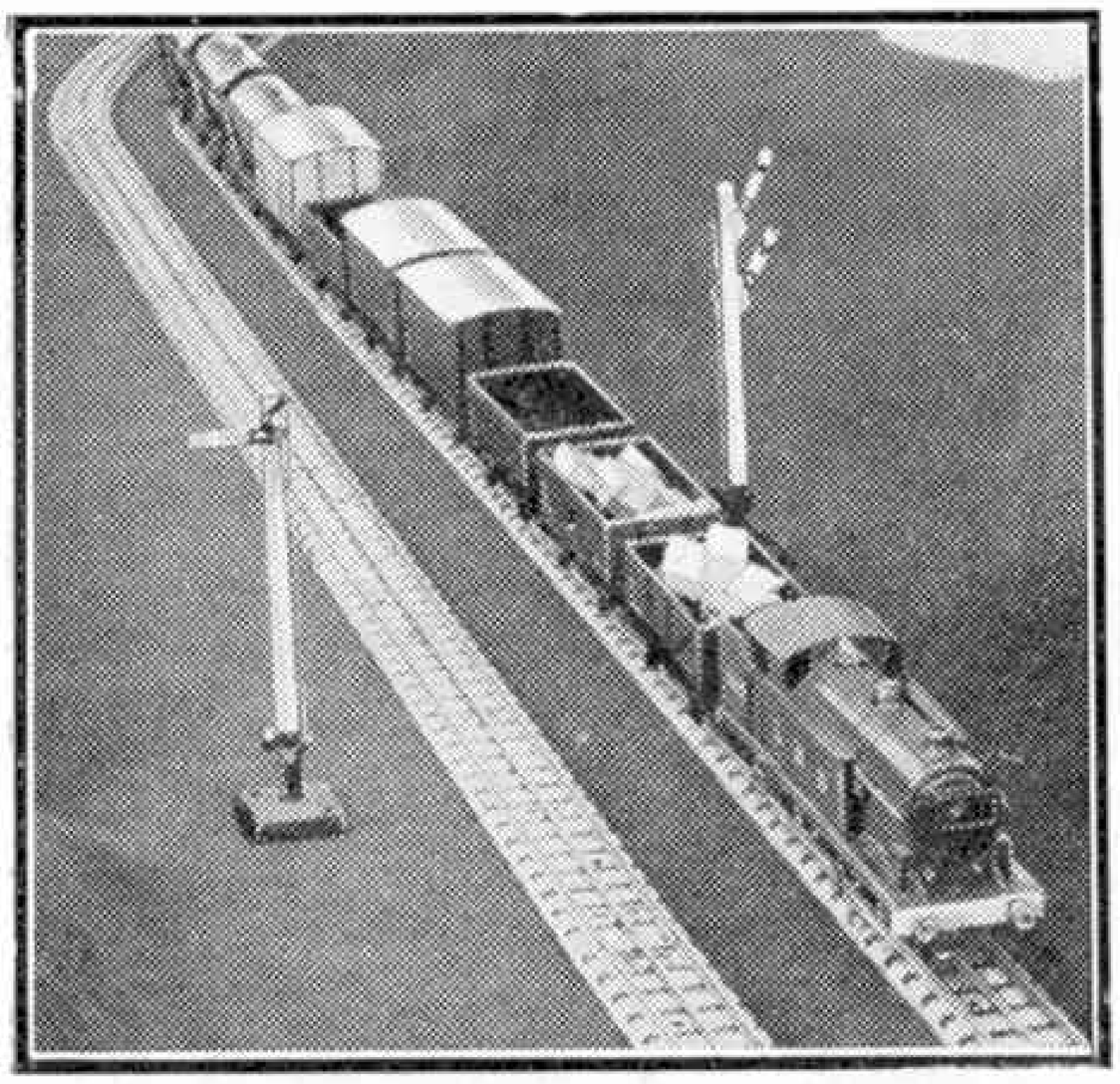
ACKWORTH SCHOOL.—The track designed for the successful Exhibition was used for operations at later meetings and then partly dismantled. An improved layout is planned for the new School term. In a very successful outing members visited a local signal box, refreshments being included in the programme. Rev. A. Armstrong, an experienced model railway enthusiast, visited the Branch and made many helpful suggestions for operations. *Secretary*: J. H. Mayo, Ackworth School, Ackworth, Yorks.

CLAPHAM COMMON.—Recent meetings were devoted to preparations for the 3rd Annual Exhibition, which was very successful. A large track was laid down and operations carried out on it were of great interest to visitors. A miniature of H.M.S. "*Rodney*" was the principal Meccano model on view. At other meetings shunting operations have been carried out and Film Shows given. The Secretary contributed a Talk on "*Club Prospects After the War.*" *Secretary*: L. E. Mason, 215, Magdalen Road, Earlsfield, S.W.18.

BRENTWOOD GRAMMAR SCHOOL.—This newly incorporated Branch has held many excellent track meetings and has otherwise followed a varied programme. Other enjoyable events have included "Army Meetings," in which members take sides and stage a battle with miniature tanks, guns and other equipment. Books on aeroplanes, railways and general engineering have been read and discussed. *Secretary*: A. R. Green, 3, Alwym Avenue, Shenfield, Essex.

WATERLOO (DUBLIN).—A proportion of the track has been relaid, and repairs have been carried out. Timetables are altered as required for track meetings. *Secretary:* S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

COLWYN BAY.—Further successful meetings have been held, and more members have been recruited. Track operations have been enjoyable, and concrete platforms are to be made. *Secretary:* W. M. Evans, "Mervyn," 20, Victoria Park, Colwyn Bay.



A simple stretch of double track main line. This shows well the realistic appearance of Hornby-Dublo Rails.

Making the Best of your Hornby-Dublo Rails

THE first requirement of a miniature railway system, apart from the space to lay it in, is the track. Many model railway owners are apt to take the rails and various track components too much for granted. The importance of using it carefully and keeping it in good order is liable to be overlooked; and the possibilities of the different pieces in the making up of a layout are not always realised. It is hoped that this article will help Hornby-Dublo owners to get the best results from their track, both from the layout and the running point of view.

As far as layouts are concerned, some idea of the varied arrangements that are possible with little difference in the actual components will have been gathered from the diagrams that have been shown in these pages during the past few months. Main line systems suitable for continuous running have been included, and there have been siding, loop line and goods yard arrangements, each scheme being made possible in most cases by a slightly different way of using this or that component.

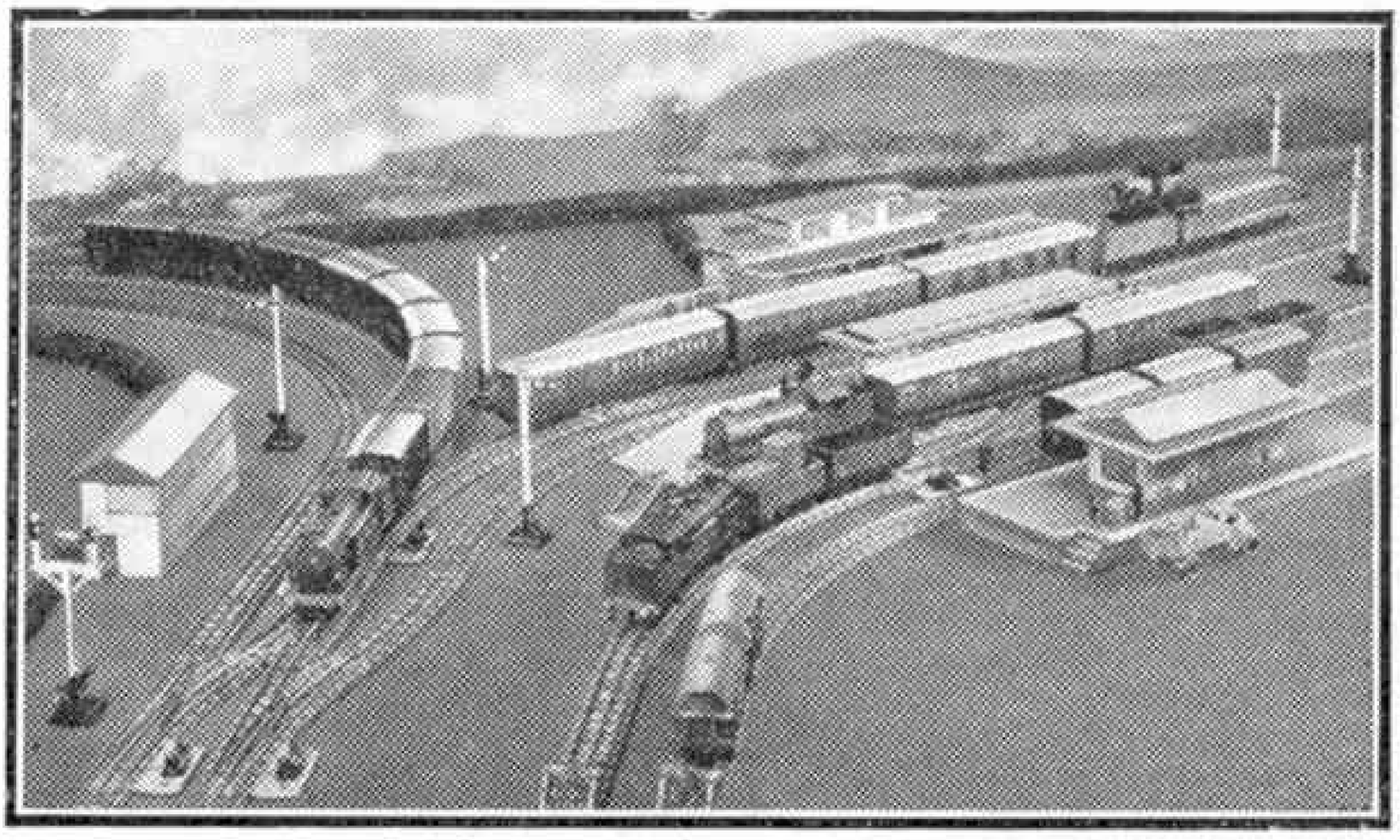
Hornby-Dublo track is so designed and constructed that nothing much can go wrong with it provided that it is used with reasonable care. In laying down the rails care should be taken to see that the centre connecting clips of each section engage correctly, and that the rail ends slide gently into the corresponding fishplates. Another point to be observed is that the correct number of rails are used for the particular formation required, so that there is no forcing or straining of the rails. When taking the rails apart after a period of running on a temporary layout, careful handling is necessary or the fishplates may be opened out and slack joints will result next time the track is in use. With permanently laid track the screws securing it to the baseboard should not be screwed down so tightly as to deform the track base.

After each spell of running, either on a portable or a permanent layout, it is a good practice to wipe the rails with a clean dry rag in order to remove any oily film that may have been deposited on them from the wheels of the trains. If this is done regularly the film is easy to remove, and thick deposits which interfere with the running of the trains will be avoided. With a permanent line, if the railway has not been used for some time it is advisable to wipe the rails over before beginning operations.

In any general looking-over of track components, such as may be carried out when the line is being put into use again after a period of storage, the centre clips and the fishplates should be examined. Any adjustments can usually be made with a pair of small pliers; fishplates that have been opened out slightly, for instance, being carefully closed up to the required extent. Points should be looked over with special care, and the working of the switch rails by means of the Points lever should be tried. If the switch rails do not lie close against the fixed rails, this should be corrected so that a perfectly smooth path is offered to the wheels, whether the Points are set for the straight run or to the curved branch. Naturally the adjustment must be made very gently.

Forming different kinds of layouts is made much easier and more fascinating if the relation between the different rails is understood. Points actually are the "key" to the situation, because the straight section of a set of Hornby-Dublo Points is equal in length to a standard Straight Half-Rail. Similarly the curved branch corresponds exactly in length and radius to the standard Curved Half-Rail. Two Points of the same "hand," either Right-hand or Left-hand, with their curved branches joined together, make up a crossover; and the distance apart of the straight tracks is that adopted as standard for double-track layouts in Hornby-Dublo. To bring the ends of the crossover units together a standard Straight Half-Rail is added to the trailing end of each of the Points.

Again, suppose we are forming a dead-end siding turning out from the main line. We add a Curved Half-Rail to make a reverse curve from the branch of the Points. This brings the two tracks parallel to each other, and to bring the rail joints opposite on both tracks we add a Straight Half-Rail as before. If we follow up this scheme and convert our dead-end siding into a loop line by using Points in this way at each end, the number of full-length Straight Rails required for the loop can easily be settled; it will be the same as the number of full-length Straight Rails lying between the Straight Half-Rails on the main line. If the latter Rails are not used, the number of full-length Straights on the loop will be one less than those on the main line between the two Points.



An interesting junction layout showing some of the uses of Hornby-Dublo Points. A train is coming off the goods branch on to the main line.

Fun with Hornby Trains

A Layout with Good Scenic Effects

THE miniature railway shown in the diagram and in the illustrations on this and the next page is a good example of a continuous system with terminal facilities arranged in an interesting manner. The layout is owned and operated by our reader H. Douglas-Reid of Monkton, Ayrshire, who has supplied the illustrations and the notes on which this article is based.

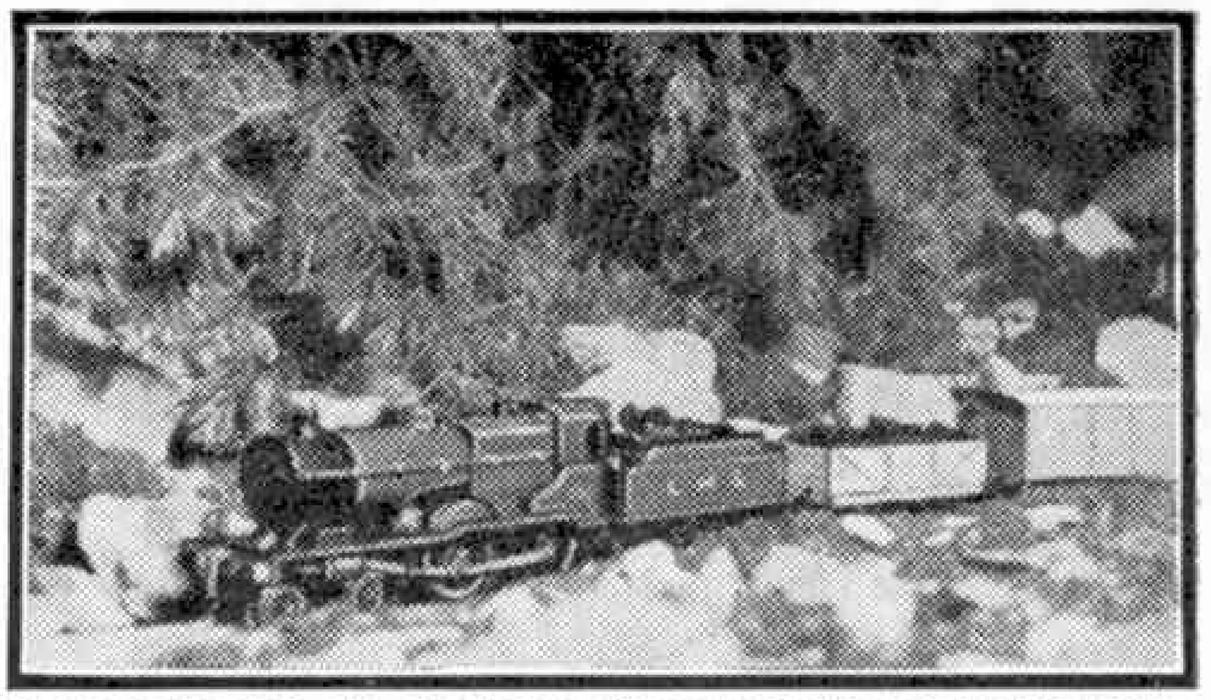
A generous amount of space is available for the line, which is an indoor one, laid in an attic and occupying an area of about 24 ft. by 12 ft. The main line, which is of course the continuous part of the layout, is laid with Hornby Solid Steel Track; this is used also for one of the terminal platform roads, but the remainder of the system consists of Hornby Tinplate Rails. As opportunity occurs these are being replaced by Steel Track. The railway is electrified and the whole of the permanent way is ballasted with grit intended for use in a canary cage! This gives a pleasing and realistic appearance.

An aid to the natural appearance of the line, apart from the scenic features we describe later, is the more or less irregular shape of the layout. As the diagram shows, the goods and passenger terminal roads are at an angle on opposite sides of the branch track that joins up with the main line by the road overbridge. Similarly the "Locomotive Department" premises are situated in the space between the goods lines and the main line. This gives the observer the impression that the different parts of the system have been placed where conditions have permitted, rather than that an exact symmetrical plan has been aimed at.

Starting from the two goods roads at the left-hand end of the diagram, the principal branch track passes across the ends of the passenger station roads with the siding between them, and turning through a reverse curve runs into the main track. Tracing this in an anti-clockwise direction, we find that it carries straight on for some distance and then turns through a complete quarter circle and enters a tunnel. Here the track is straight, and on emerging it turns again through a quarter circle. After another straight length a reverse curve follows to take the line past a scenic feature known as the rock face. A long and practically continuously curving stretch brings the main line round to the points where the branch lined is joined.

A special feature has been made of the scenic effects. These are mostly "Highland" in character, which is in keeping with the situation of the line in Scotland. The effects are obtained by actual modelling both in the foreground and in the background, and the illustrations show what realistic results have been obtained. Actual moss and pieces of stone of various sizes have been used to form banks, cuttings and so on. Trees are represented by twigs of different kinds, chiefly pine. Pine twigs with a certain amount of greenery on them make good miniature trees and they keep their colour for some time. One method of preserving them is to dip each twig selected into gum, them allow this to drain off. Before the gum sets, the different offshoots of the twigs can be bent or "moulded" this way and that so that a well-balanced tree results.

The rock face referred to previously is modelled with fairly flat-surfaced lumps of red sandstone, moss and smaller stones being added as required. It gives the effect of a mountain ledge along which the railway has been carried. The upper illustration on the next page shows how effective is this feature of the surroundings of the line.



Hornby L.M.S. No. 2 Special Standard Compound hauling a fast goods train in typical surroundings.

The locomotives are all of Hornby manufacture and are six in number. Pride of place is taken by an L.M.S. 4-6-2 "*Princess Elizabeth*," which is used for the principal express trains. There is also a Standard Compound L.M.S. Locomotive of the well-known No. 2 Special Clockwork type. This assists in the working of expresses, and in addition deals with subsidiary passenger trains as well as taking a turn in operating fast goods services. The upper illustration on this page shows this engine engaged on the latter duties. The other engines are all of the tank type, the largest being L.M.S. No. 2 Special No. 6781, a black 4-4-2T, which figures in the "rock face" illustration referred to previously.

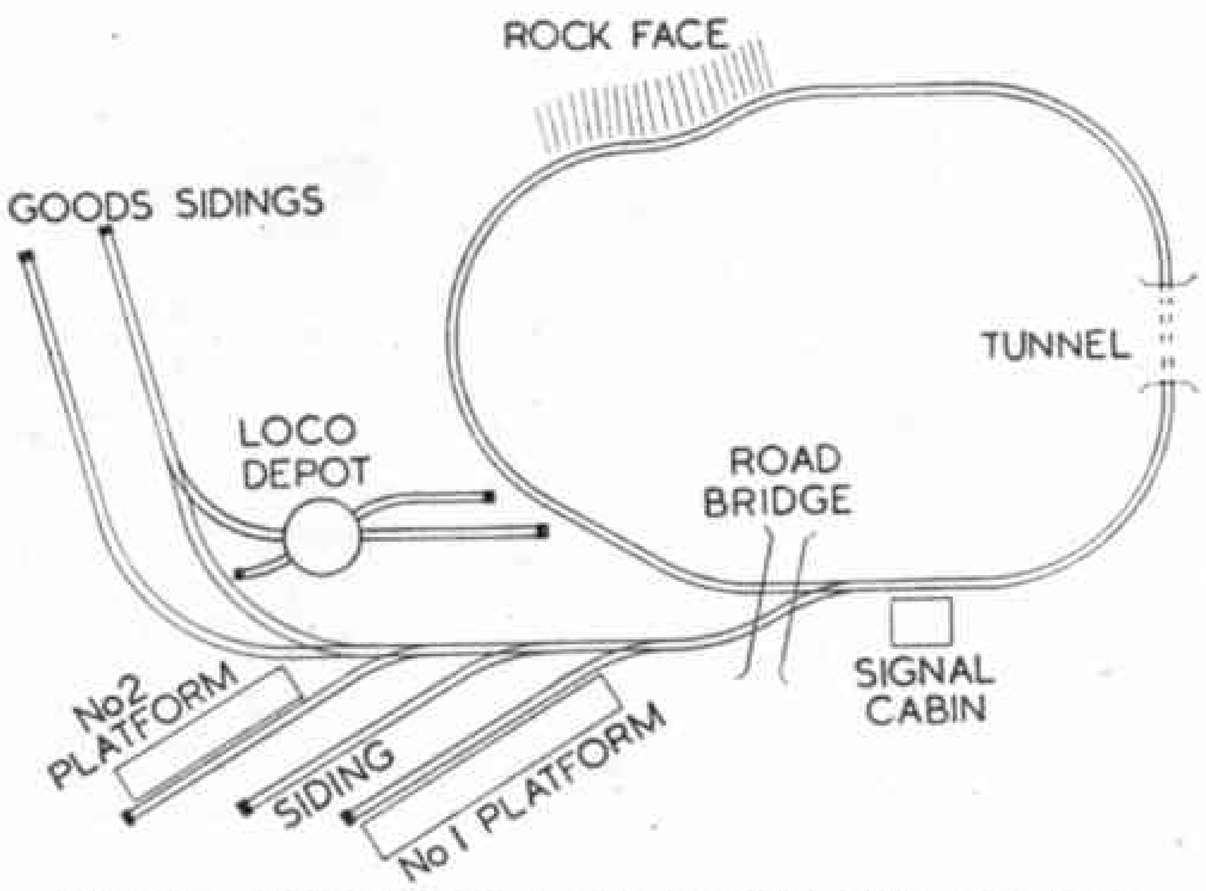
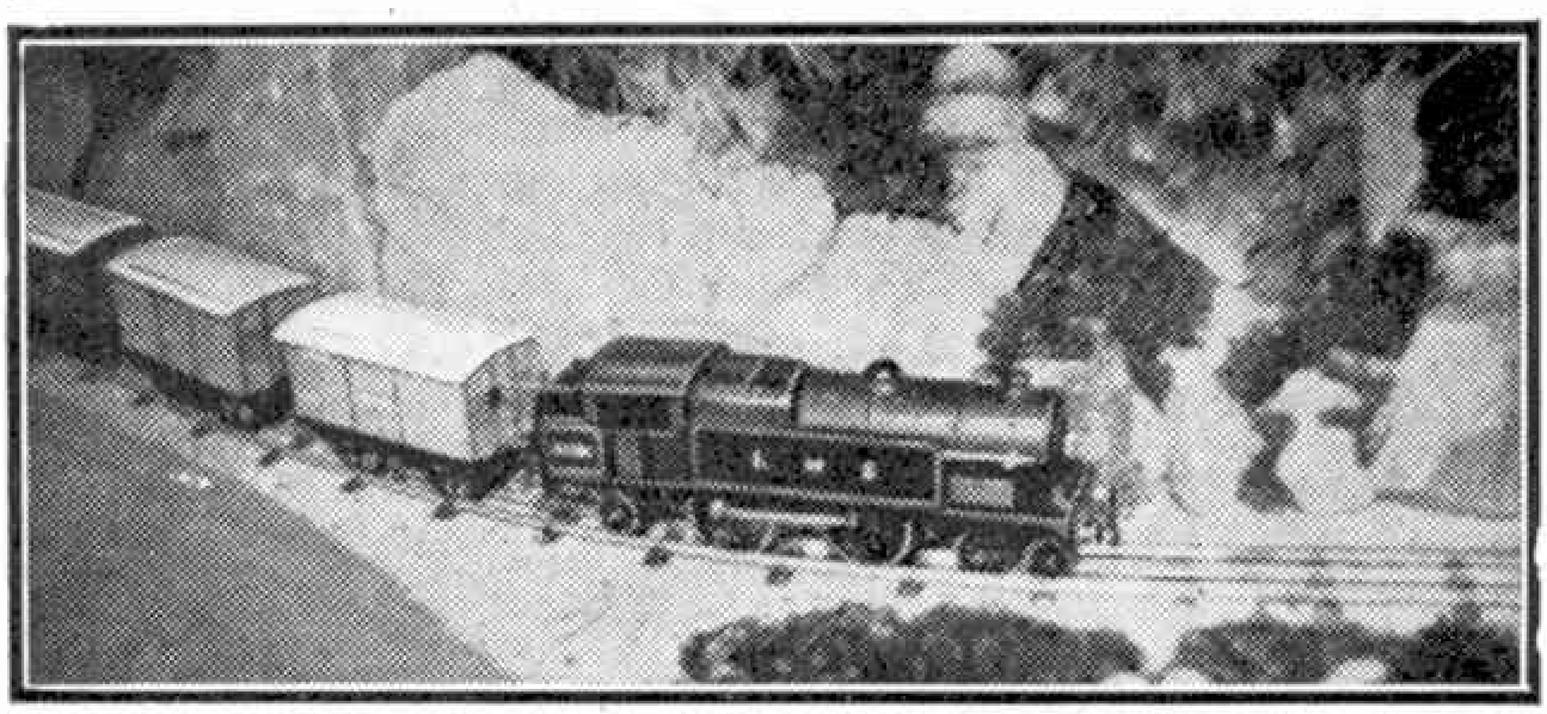


Diagram of the layout of H. Douglas-Reid, Monkton, described in this article.

Further down the power scale come a pair of No. 1 Special Tanks, also finished in black. They put in a great deal of their time on local goods work, though they also share in suburban passenger duties. The smallest locomotive on the line is a No. 1 Tank, but it is not the least useful or important. It spends all its working time shunting in the goods sidings and in "carriage pilot" and other duties in the passenger station. It is black, like all the other tank engines, but is lettered "L.N.E.R." Although thus an "odd one out," its presence on an L.M.S. line is quite topical, for transfers of engines from



A "perishable freight" train passing the rock face that is one of the scenic features of the layout.

one line to another are now quite common.

The passenger rolling stock includes Pullman, Saloon and No. 2 Corridor Coaches for express trains, and they are used also to a certain extent for main line stopping services. No. 1 Coaches and the corresponding Guards' Vans are invariably used for making up the suburban trains. They have the advantage of being fairly light, and they are compact so that the use of say two additional Coaches on a train during busy periods will not cause any difficulties either to the locomotive or in dealing with the train alongside the platforms.

Two of the No. 2 Corridor Coaches, which are naturally in L.M.S. style, have been altered slightly to form a two-coach articulated set or "twin." The method used closely follows a scheme that was suggested in the "*M.M.*" quite a long time ago, although the vehicles then dealt with were Saloon Coaches, as the No. 2 Corridor stock was not then available. At one end of each coach the bogies and buffers were removed, also the automatic couplings. In place of each of the latter was tightly bolted to the Coach floor a Meccano 2½ in. Strip, its centre hole being made to coincide with the hole in the Coach floor originally used for securing the coupling. This resulted in a part of the Strip projecting from the end of the Coach. The end holes of each Strip were brought together and made to pivot on the centre of one of the removed bogies by means of a "king pin" made of a short Meccano Rod with a Collar attached to prevent the pin slipping through.

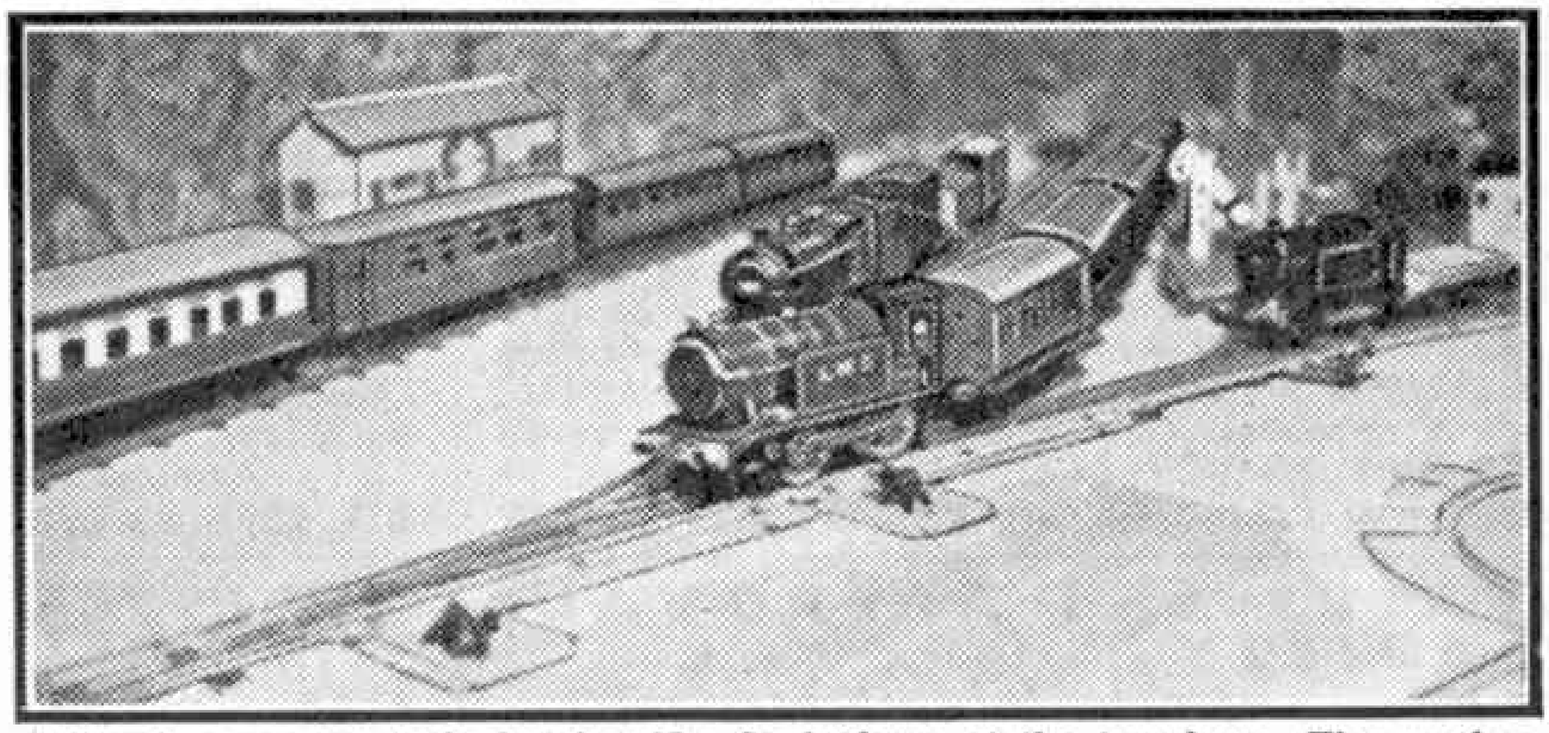
The outer end of whichever Strip is to come uppermost should be set up slightly to allow for the thickness of the other Strip and so keep the Coach floors level with one another. This is a point to be remembered by any readers who decide to try this scheme. The L.M.S. vehicles at present being considered closely resemble in their articulated state the centre-corridor articulated "twins" introduced for long-distance excursion working some years ago by the L.M.S.

A large variety of freight rolling stock is in use so that a complete service of goods trains of all kinds can be run. Many of the vehicles have had their tinplate wheels removed and replaced by Hornby die-cast wheels. This gives a marked improvement in the running.

Another alternative that has had some success has been the replacement of the standard couplings on certain Wagons and Vans by hooks and three-link chains coupling of the "scale model" kind. These give a realistic "opening out" and "closing up" of the train as the engine takes the load or checks its speed. On the Steel Track with its large radius curves vehicles run well, but on the 2 ft. radius curves of the Tinplate section trains need very careful management to avoid buffer locking. Actually it is always advisable, when using couplings of this kind, to provide the vehicles so fitted with buffers having larger heads than usual. When an engine is pushing a train round curves there is almost bound to be buffer locking, even on Steel Track, unless such buffers are fitted. On the present layout the altered vehicles are considered as "brake fitted" stock, and so they are used for express freight working for the most part; in addition odd vans may be attached to passenger trains when required.

In the operations carried out on the line special attention is given to express passenger trains and some interesting evolutions are carried out. A favourite scheme is to assemble a heavy express at the terminus and to dispatch this on its journey in charge of the 4-6-2 "*Princess Elizabeth*." As the layout is at present with no intermediate station on the main circuit and no "return loop" from side to side of the main oval, trains necessarily end their journeys by running past the signal cabin and then backing into either of the platform roads.

Actually in the case of the "Princess"-hauled express the train is divided into two portions after arrival, the return trip being made with one portion in charge of the Standard Compound and the other with the No. 2 Special Tank at its head. In fact these engines can be waiting at the buffer stops ready for their respective portions to be pushed into the station in turn. Then, when the 4-6-2 has been disposed of, either into the centre siding in the terminal or in the locomotive yard, the Compound and the No. 2 Special Tank can begin their journeys, one at a time, by backing their trains out on to the main line. Once clear of the points the trains can be restarted in a forward direction, and each one in turn run directly into a platform road after the required number of main line circuits has been completed.



A local passenger train leaving No. 2 platform at the terminus. The engine is a No. 1 Special Tank.

This method of working is unusual, but it makes for some interesting engine and train movements. Dead-end stations where reversal of a train is necessary in order that it can continue a through journey are found in actual practice. Similarly at Templecombe the trains of the Somerset and Dorset Joint system that call there have to arrive or depart "in reverse" according to whether they are northbound or southbound, owing to the layout at this particular point. In the model system, to guard against any possible mishaps, the two platform roads and also the passenger siding, have been provided with Buffer Stops of the hydraulic type.

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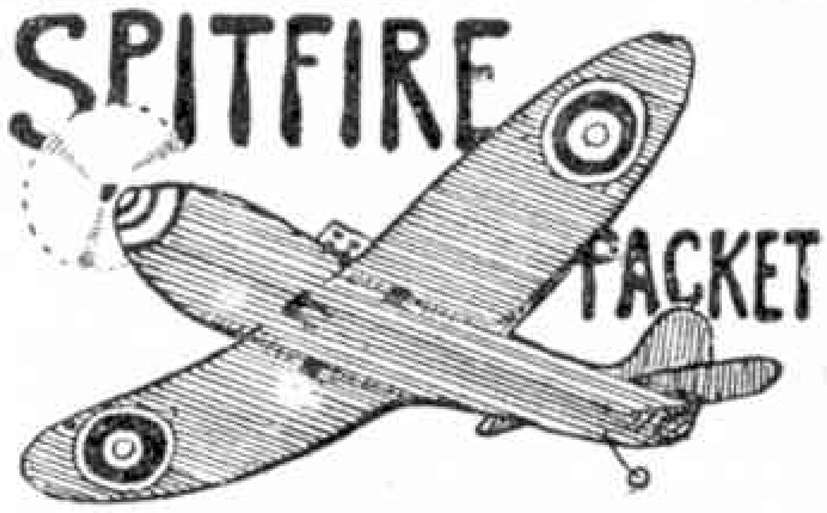

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Stamp Collecting

Sport on Stamps

A FASCINATING special collection of the kind that we have often suggested to our readers would be one illustrating sports and games. There is a surprising number of attractive stamps available for such a collection. Some of them illustrate sports characteristic of the countries issuing them. For instance, baseball is the subject of a fine stamp issued on 12th June 1939 in the United States to celebrate the centennial of the game. This stamp, which is illustrated here, is of 3c value and is bright violet in colour. The design shows a game in progress, not in a huge stadium, but on a village green. Finland too had an issue showing various aspects of a characteristic sport, in this case ski-ing. There are three stamps in the issue, which appeared on 18th January 1938 to commemorate the international ski-ing contest at Lahti. The lowest value, 1m.25 + 75p, black, illustrates long distance ski-ing; the 2m. + 1m. value, lake in colour, shows ski-jumping in progress and the remaining value, 3m.50 + 1m.50, in blue and pale blue, depicts a downhill ski-ing contest.

It is very interesting to find that Association football predominates over the sports and games featured on stamps, and it is strange to realise that Great Britain, the original home of the game, cannot be represented in a sports collection by a football stamp. On this page we illustrate two examples from other countries. One is a 1f. 75c. French commemorative issue of June 1938 showing a goalkeeper taking an amazing flying leap to intercept a header from an opposing forward. The other is a Bulgarian stamp. To most of us it is a surprise to find an excellent football stamp among the issues of this country, which we do not usually associate with the game, yet the 21 value of the Balkan Olympic Games series of September 1931 is in every way worthy to represent football in our collection.

Other fine football stamps come from Holland and Italy. The Dutch example was issued in March 1928, while Italy has provided us with several fine football stamps, one of them issued in May 1934 in an air series celebrating the world championship contest. This was the 75c. value, which shows a footballer in action, the remaining three stamps showing grounds at Rome, Turin and Bologna, in each case with a flying boat passing over. A special commemorative issue of five stamps of the same date includes three designs showing respectively players heading the ball, a goalkeeper leaping upward with outstretched arms to deal with a high shot, and a tackle during the game.

Hungary issued a series of sporting stamps in 1925, each of which was sold at a premium equal to its face value, the money so raised being used in aid of sports associations. The 2000 kr. value of this series shows a game of football in progress, again with a goalkeeper leaping up to take a high shot. The spectacular dives and leaps of goalkeepers clearly are favourite subjects with designers.

The strangest of all football stamps comes from South America. Football there is extremely popular, particularly in Uruguay, a country that has twice won the football contest at the Olympic Games. On each occasion a stamp was issued in celebration of the great event. The first, which appeared in 1924, shows the famous statue "Victory" of Samothrace, and was issued in three values. The second, commemorating a further victory of the Uruguayan football team in the Olympic Games, is a far different one, in the design of which the artist has given way to his national exuberance. Chief place is occupied by a set of goal posts. These are made, not of plain wood, but of trunks of trees from which branches luxuriant foliage, and on the cross bar is an outsize football, nicely balanced, on which stands a bird that appears to be crowing a welcome to the victors. Behind this magnificent show of fancy is a hill over which the Sun is rising. This design appeared in three values in 1928, and with it we may leave football as portrayed on stamps.

Other sports are well represented, chiefly in the series commemorating Olympic Games to which reference has already been made. One of the best of these was issued by Holland in 1928. There were eight values in this, the designs illustrating rowing, fencing, yachting, putting the weight, running, riding and boxing in addition to football. Greece too has produced Olympic Games series, and indeed, was the first country to do so, for its series of 1896 was issued in commemoration of the 1st International Olympic Games, held in that year. Gladiators, a discus thrower and a chariot driver were the sporting subjects included in this series, which included also a view of the stadium at Athens. A second series appeared in 1906, when classical sporting events were again depicted. There were 14 stamps in this series, in 9 designs, of which three show discus throwing, wrestling and running. A further Greek issue of 1939 in commemoration of the 10th pan-Balkan games, held that year in Athens, included four stamps illustrating athletics of classical times; and yet another Greek stamp that could well find place in our collection is one of 8fr.

(*Continued on page 337*)

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For other Stamp Advertisements see pages 334 and v.

Stamp Gossip

and Notes on New Issues

New Stamp Issuing States

The appearance in the stamp world of two new issuing states is an event of considerable interest. The states concerned are Shihr and Mukalla, and Seiyun respectively, and both are within the Aden Protectorate. In each case the lowest values, ½a, ¾a and 1a, which are green, chestnut and blue respectively in colour, carry portraits of the ruler of the State, while the remaining stamps show scenes in Southern Arabia, all with inset portraits of the respective rulers.

The new stamps form handsome sets, and will be splendid additions to the pictorial collections that so many of our readers have formed. The values and subjects of the pictorial stamps in the issues are as follows: Shihr and Mukalla; 2a, sepia, gateway of Shihr, principal town and important commercial centre; 2½a, blue, leaning houses of Shibam, built in this way to reduce the stress on the mud bricks used; 3a, sepia and carmine, a watch tower; 8a, orange, view of a sacred city; 1r, green, city view, including a castle; 2r, blue, mosque of Hureidha 5r, olive, views of Meshed, holy city of southern Arabia. The 1½a value, carmine, shows the harbour of Mukalla. Seiyun; 1½a, red, the Sultan's palace at Seiyun; 2a, sepia, mosque in the ancient city of Tarim; 3a, sepia and carmine, palace at Tarim; 2½a, blue, 8a, orange, mosque at Seiyun; 1r, green, south gate of Tarim; 2r, blue and mauve, typical house; 5r, brown and olive, doorway of a mosque. The 5r stamp had not been issued at the time of writing, and this applied also to the 2r stamp of Shihr and Mukalla.

Soviet Stamps

In February last a special stamp was issued in Russia in honour of the mass rally of the Soviet people in defence of their country. The value is 30k, and the stamp is blue. The design shows a group assembled with rifles under the national flag.

Other stamps recently issued in Soviet Russia are commemoratives. The first is concerned with the Lenin Museum at Moscow and the issue includes four stamps in two designs. The 15k and 45k values, carmine and green respectively, show students before the bust of Lenin, and a 30k and 1r, violet and chestnut, illustrate the facade of the Lenin Museum.

The second of these commemoratives celebrates Alischer Nawod, a Turcoman poet of the 15th century. There are two values, 30k and 1r, both bearing the portrait of the poet.

* * *

On 12th October it will be 450 years since the discovery of the new world by Colombus, and it is expected that this interesting event will be marked in the Argentine by the issue of a special stamp, of value 15c.

* * *

Canada's "War Effort" Issue

We illustrate this month three further stamps from the new "War Effort" series issued in Canada. These are the 4c, 6c and 10c values, the colours of which are grey, blue and brown, respectively. The 4c value shows grain elevators, and the 10c value illustrates the Parliament buildings at Ottawa. The 6c value is an airmail stamp, and shows an airfield, with fighters on the ground and in the air.

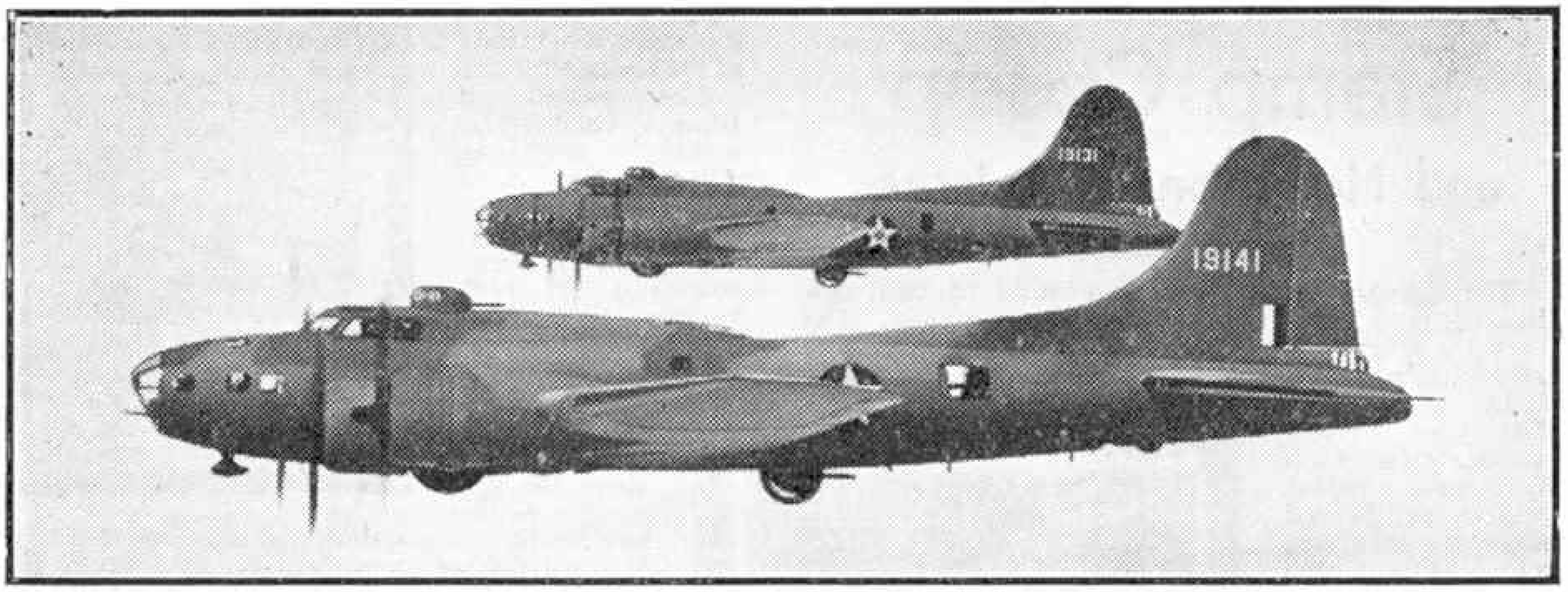
Sports on Stamps

(Cont. from page 335)

value issued in December 1934 that shows the entrance to the stadium at Athens.

We have already referred to the Bulgarian series of September 1931 to celebrate the Balkan Olympic Games held in that country, and need only add that this fine series includes designs representing jumping, diving, fencing, cycling and horse riding as well as football. The fencing stamp, the 611 value, is shown on this page, and the 11 value is reproduced on page 335. The seventh and last of the series illustrates the spirit of victory. A particularly fine hurdling stamp comes from Cuba, with a design that was used on five values of a series issued to celebrate the Olympic Games of 1930. This design is reproduced at the top of this column, and it will be seen from it that the hurdler depicted is full of life and vigour.

We have given sufficient examples to illustrate the scope of the sports collection. Many stamps dealing with a wide range of other sports are to be found, and we can assure readers who set out to form such an assembly that they will find the pursuit interesting and the result well worth while, when attractively displayed, as a fine example of the attractions that stamps offer.



A fine flight photograph of two new Boeing B-17E "Flying Fortress" heavy bombers for the U.S. Army Air Forces. Illustration by courtesy of the Boeing Aircraft Company, U.S.A.

A Central London Bus Garage—

(*Continued from page 312*)

incorrectly fitted shoe to be supplied to a bus.

Outside the machine shop are the seven special pits used for inspection and repair work, and behind these are shops used by coppersmiths, electricians, painters and coachmakers.

Alongside the ground floor and on the first floor above are the offices used in connection with the work of the garage. There are also recreation rooms and a canteen.

Finally there are the various stores in which are kept oils, tyres, spare parts and even fire-extinguishers, all ready for instant use.

The Royal Marines—(*Continued from page 307*)

Their strength rose to 55,000 in the last war, and at the Battle of Jutland no fewer than 5,800 of all ranks took part in the various ships. At Gallipoli, the Plymouth battalion was among the first to attempt a landing, and was also among the last to leave the Peninsula many months later.

In March 1918, King George V, Colonel in Chief, ordered that the senior squad of recruits should be known as the "King's Squad," and that the best all-round recruit should wear a special badge throughout the rest of his service. This is worn on the left arm just below the shoulder, and consists of a laurel wreath encircling the Royal Cipher; and as it was instituted by King George the Fifth, it is laid down that the badge shall always contain the lettering "G.R.V.," and not the cipher of the reigning sovereign. The Marine on this month's cover is wearing this badge.

In this war the Marines have already shown their prowess on many fronts. Iceland and the Faroes were first occupied by them in April 1940, and in the Norwegian campaign they made appearances at several points. A company landed at the Hook of Holland in May to cover the withdrawal of other troops and the work of the demolition parties; similar parties operated at Boulogne and Calais.

Perhaps their most striking feat of arms was the covering of the withdrawal from Crete. In all, some 2,000 Marines were landed, comprising light and heavy batteries, a searchlight company, companies to man the coast defence units and other specialists. Yet every man had also his rifle and bayonet, for the Marines are given the most exacting infantry training in addition to all the other things they learn. Despite the merciless attacks of the enemy aircraft to which almost no serious counter-measures could be opposed, the Marines dealt sharply with many parachute parties, and fought numerous highly successful actions in driving these gentry out of the strong points in which they had temporarily established themselves. When at one point the Marines were driven from the guns they were serving, they remained in action for the rest of the day as infantrymen. When the line broke on 26th May 1941 in the Canea sector, the Marines were the last battalion to remain in line, and during the last few days they formed the magnificent rearguard by the conduct of which the others were enabled to embark. Their casualties were heavy; of 2,000 landed, some 1,100 failed to return.

Truly the words of Nelson's Admiral Lord St. Vincent, speaking of the Marines, are as forceful to-day as they were when uttered: "There never was any appeal made to them for honour, courage, or loyalty, that they did not more than realise my highest expectations. If ever the real hour of danger should come to England, the Marines will be found to be the country's sheet anchor."

Niagara's Latest Bridge—(*Continued from page 323*)

completed and the bracing members were placed in position. Then began the erection of the spandrel columns that rest upon the arch and support the deck of the bridge, after which the floor system was laid down. This work was carried out rapidly. The arch itself was built in less than four months from the erection of the first rib section, and from the closing of the arch the deck was completed in about a month.

COMPETITION RESULTS

HOME

May "Station Names Contest."—1. R. E. Jenkins, Brentwood. 2. C. E. Wrayford, Bovey Tracey. 3. P. W. Stock, Bedford. Consolation Prizes: A. P. Hockaday, Harrow; A. Elvey, London S.E.9; E. Elvey, London S.E.9.

May "Missing Word" Contest.—1. C. E. Wrayford, Bovey Tracey. 2. T. D. Tasker, Barnsley. 3. F. Mills, Kearsley.

May "Photo." Contest.—First Prizes, Section A: R. Atkins, Monton. Section B: J. M. Sharp, Worcester. Second Prizes, Section A: G. F. Webb, Swindon. Section B: R. Maker, Welwyn Garden City.

OVERSEAS

January "Cover Voting" Contest.—1. C. Ricketts, Heidelberg, S.A. 2. G. A. Grant, Johannesburg, S.A. 3. G. Myburgh, Claremont, S.A. Consolation Prize: F. Jowett, Ontario.

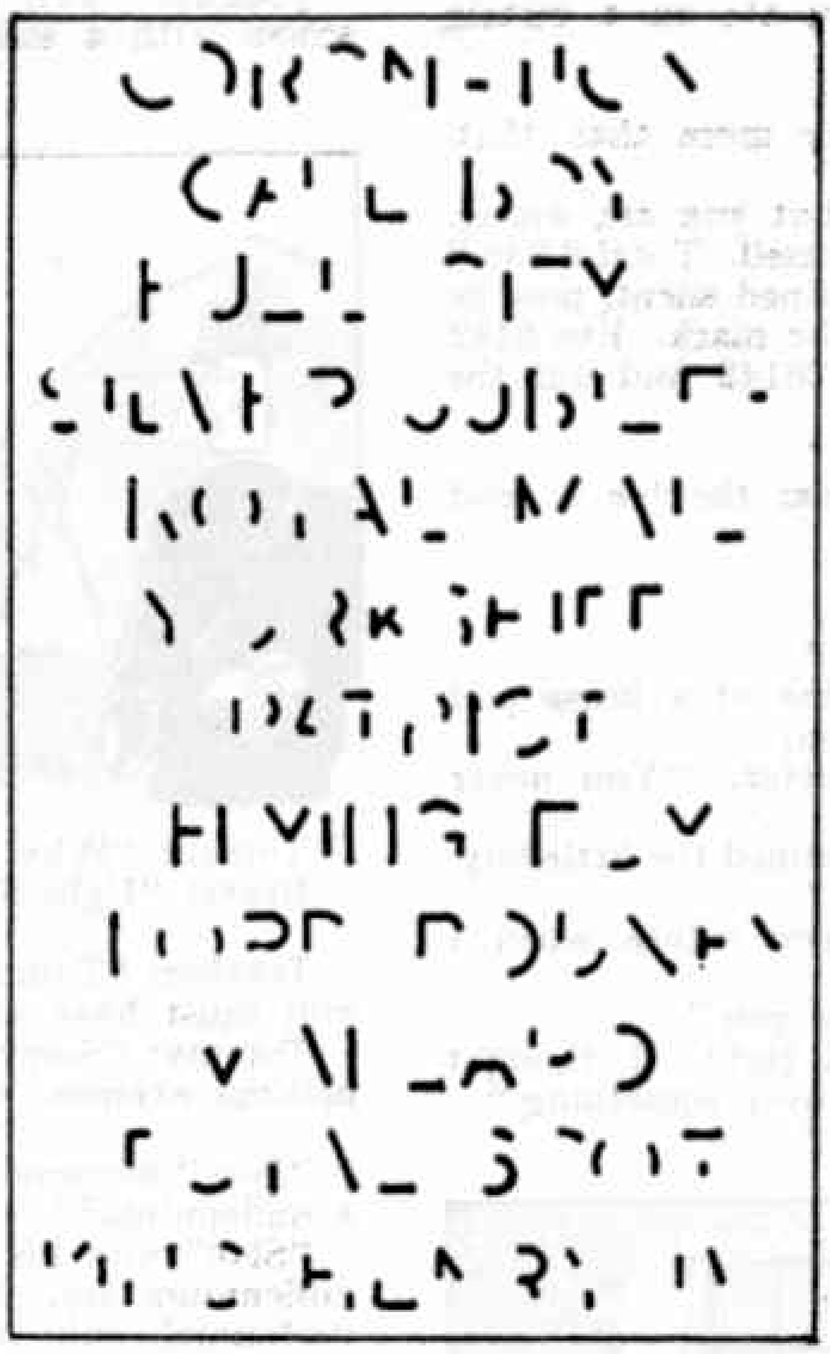
January "Photo." Contest.—First Prizes, Section A: M. Mills, Cape Town, S.A. Section B: D. Mills, Cape Town, S.A. Second Prizes, Section A: H. Wilson, Perth. Section B: P. Simpson, Auckland, N.Z. Consolation Prizes: J. Manson, Wellington, N.Z.; S. Baker, Johannesburg, S.A.; G. Watson, Toronto.

Competitions! Open To All Readers

What are these Engine Names?

Here is an interesting contest that will appeal to every reader of the Magazine. In the centre of this page is a panel giving the remains of 12 names of locomotives. These names were first printed in full, and then a portion of each letter was removed, so that none of the names can now be read at a glance.

The locomotives represented are all well known by name, and have been mentioned from time to time in the *"M.M."* Even those who are not familiar with the names of locomotives will be able to make good in this contest, however, for a little ingenuity will enable them to fill in the vacant portions.



All that competitors are asked to do is to read the 12 names and then to make a list of them, and to forward this to *"September Names Puzzle, Meccano Magazine, Binns Road, Liverpool 13."*

There are the usual two sections, for Home and Overseas readers respectively, and in each there will be prizes of 21/–, 10/6 and 5/–, for the best entries in order of merit. In the event of a tie for any prize the judges will take the neatness and originality of the entries into account in making their decision.

Closing dates: Home section, 30th September; Overseas section, 30th January 1943.

September Pointword Contest

For our general competition this month we are reproducing one of a type that has always proved popular. Competitors are asked to choose any phrase or sentence containing 25 letters from the pages of the present issue, and to re-arrange the letters to form a square of five letters in each direction. The game is to arrange the letters so that as many complete words as possible are formed in both the vertical and horizontal lines. For each word of five letters in one line 10 points are awarded, for a word of four letters five points, for a word of three letters two points, and for a word of two letters one point. A line containing words of three and two letters respectively thus secures three points. Each letter may appear in the square only as many times as it occurs in the original sentence, and short words forming part of a longer word in the same line cannot be admitted.

To make the working clear we have given an example in the lower illustration on this page. The phrase used is *"Action and sound are combined."* This specimen "Point Word" has been so arranged that it makes the system of scoring quite clear. It will be seen that the total score is 54. The maximum score that can be made is 100, but a score of 60 is probably very satisfactory. A useful hint is that the phrase or sentence chosen should be one that contains a fair sprinkling of such letters as E, S, T and R.

The contest is divided into two sections, for Home and Overseas readers respectively, and in each there will be three prizes of 21/–, 10/6 and 5/– each. As usual in these contests the judges will take neatness and novelty into consideration if there is a tie for any prize. Closing dates: Home Section, 30th September; Overseas Section, 30th January 1943. Entries must be addressed *"Pointword Contest, Meccano Magazine, Binns Road, Liverpool* 13."

	10	2	1	2	5
10	S	E	D	A	N
10	A	D	O	R	E
2	T	I	C	C	O
2	I	N	U	B	N
10	N	O	M	A	D

Total: 54

September Photographic Contest

In this month's photographic contest prizes are offered for the best photograph of any kind submitted. There are two conditions—1, the photograph must be taken by the competitor, and 2, on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired. We remind readers that they must not photograph any features of military importance.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed *"September Photo. Contest, Meccano Magazine, Binns Road, Liverpool 13."* There will be separate sections for Overseas readers.

In each section prizes of 15/– and 7/6 will be awarded, together with consolation prizes for other good efforts. Closing dates for this Contest: Home Section, 30th September; Overseas Section, 30th January 1943.

Fireside Fun

APPLES UNLIMITED

Smith asked his friends Brown, Miller and Riley how many apples Adam and Eve ate on a certain memorable day.

"One," said Brown promptly.

"No," chimed in Miller; "Many more than that. Eve 81 and Adam 812, total 893."

"You're clever," said Smith, "but you are wrong. Eve 814 herself and Adam 8124 himself. Total 8,938."

Up to this point Riley had remained silent; now he spoke. "You are all three far off the mark. Eve 8142 know how it tasted, and Adam 28142 find out the same thing. Total 36,284."

* * * *

Petrol Station Attendant: "I hear they've a good substitute for petrol now."

Motorist: "Oh! What is it?"

Attendant: "Shoe leather."

* * * *

Dick finished drawing the outline of a horse and began to fill it in with green crayon.

"That's not right," said his sister. "You never saw a green horse."

"Oh this one isn't ripe yet," exclaimed the little boy

* * * *

Young Officer: "Why didn't you salute when I passed?"

Private: "Sorry sir, I didn't see you."

Young Officer: "Oh, that's all right. I thought maybe you were vexed with me over something."

* * * *

"Did you ring the bell, Sir?"
"No, I was tolling it. I thought you were dead!"

* * * *

Customer: "Have you any apples?"
Grocer: "Do you want them to cook or to eat?"
Customer: "Both. That's what I cook 'em for."

* * * *

"Say, waiter, I can't eat this awful stuff—I want to see the manager."

"Sorry, sir, he's out to lunch."

"What, gone out to lunch!"

"Certainly, sir. You don't think he's going to eat in this terrible hole do you?"

* * * *

"Well Peleg, how do you find the encyclopædia the feller left on approval?"

"Seems to be all right. Ain't no errors in it so far as I kin see."

* * * *

Mother: "If you fell in the water, why are your clothes dry?"

Tommy: "I took 'em off in case of accident."

* * * *

THIS MONTH'S HOWLER

THERM: A microbe that gets into gasmeters and causes rapid consumption.

Teacher: "Johnny, can you tell me what a hypocrite is?"

Johnny: "Yes, ma'am. It's a boy what comes to school with a smile on his face."

* * * *

Tourist: "Why doesn't the squaw ride?"
Brave: "Ugh! She's got no pony!"

* * * *

Teacher: "Tommy, you were absent yesterday and you must have an excuse written by your father."

Tommy: "Sorry, Ma'am, but father ain't no good making excuses; ma catches him every time."

* * * *

"Pop," inquired little Clarence Lilywhite, "what am a millennium?"

"Sho!" said his parent. "Doan' you know what a millennium am, chile? It's jes' about de same as a centennial, on'y it's got mo' legs."

* * * *

Two country youths were on a visit to London. They went into the British Museum and saw a mummy, over which hung a card on which was printed, "B.C. 87."

They were mystified, and one said: "What do you make of that, Sam?"

"Well," said Sam, "I should say it was the number of the motor car that killed him."

* * * *

"Is there anything you can do better than anyone else?"

"Yes," replied the small boy. "I kin read my own writing."

* * * *

Teacher: "Why don't you comb your hair?"

John: "I haven't got any comb."

Teacher: "Why don't you ask your mother to buy a comb?"

John: "Cause then I would have to comb my hair."

* * * *

Henry: "Lumme! Grandpa thinks it's the battle of 'Astings again!"

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—continued from pages 334 and 336

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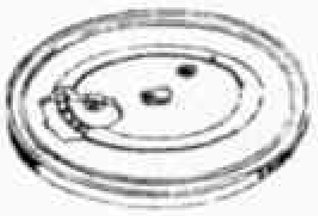

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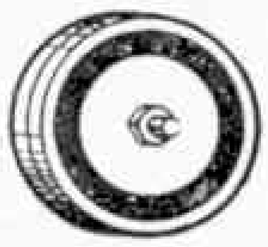

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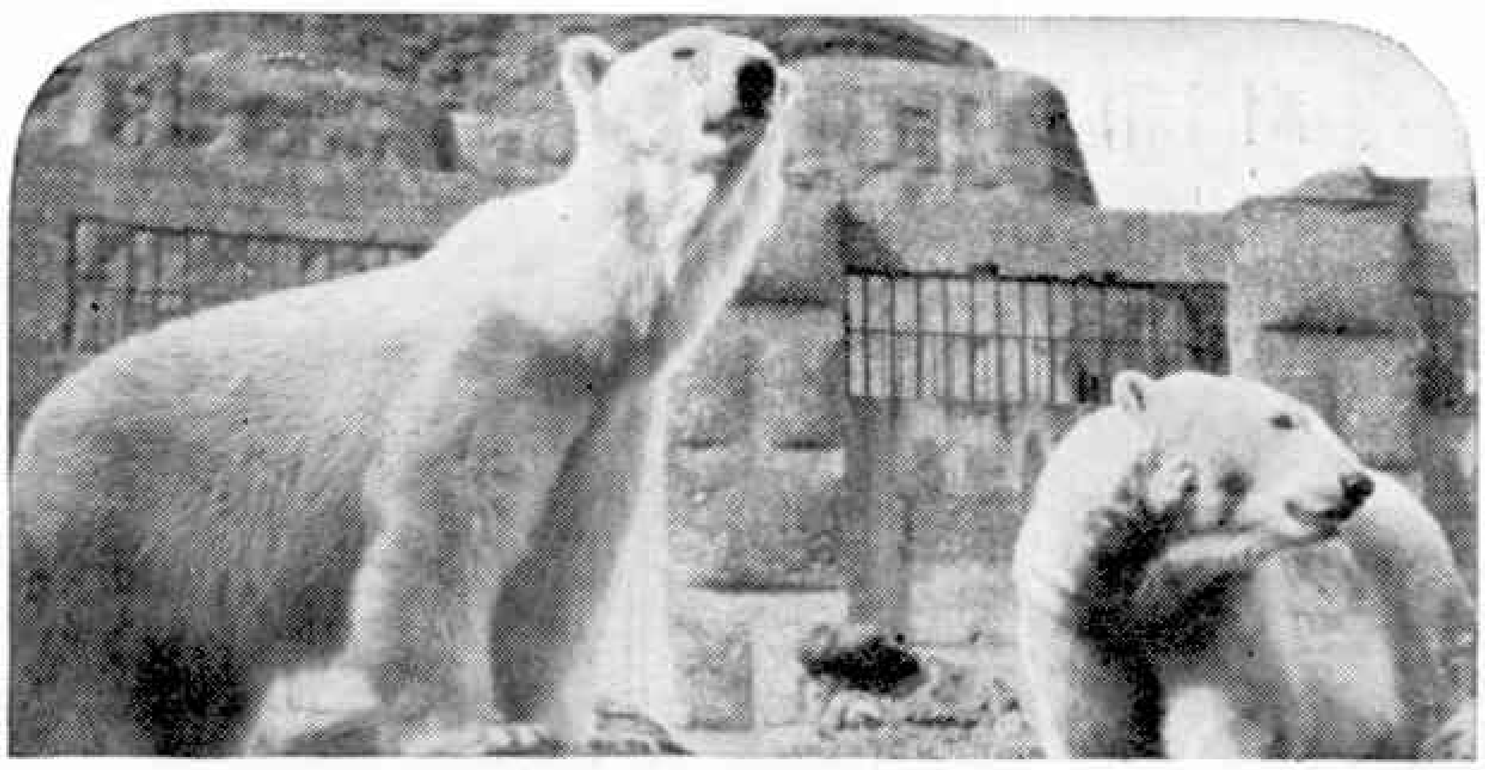

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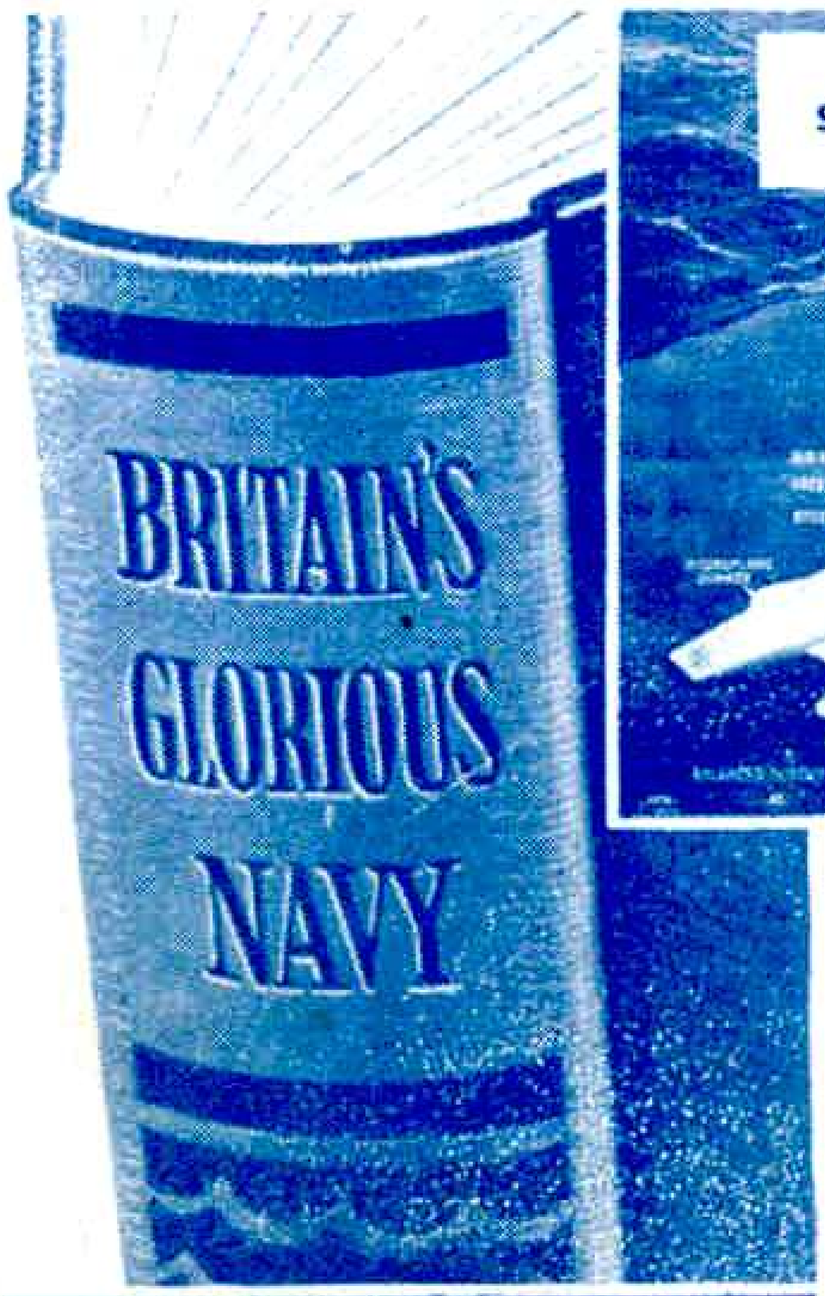

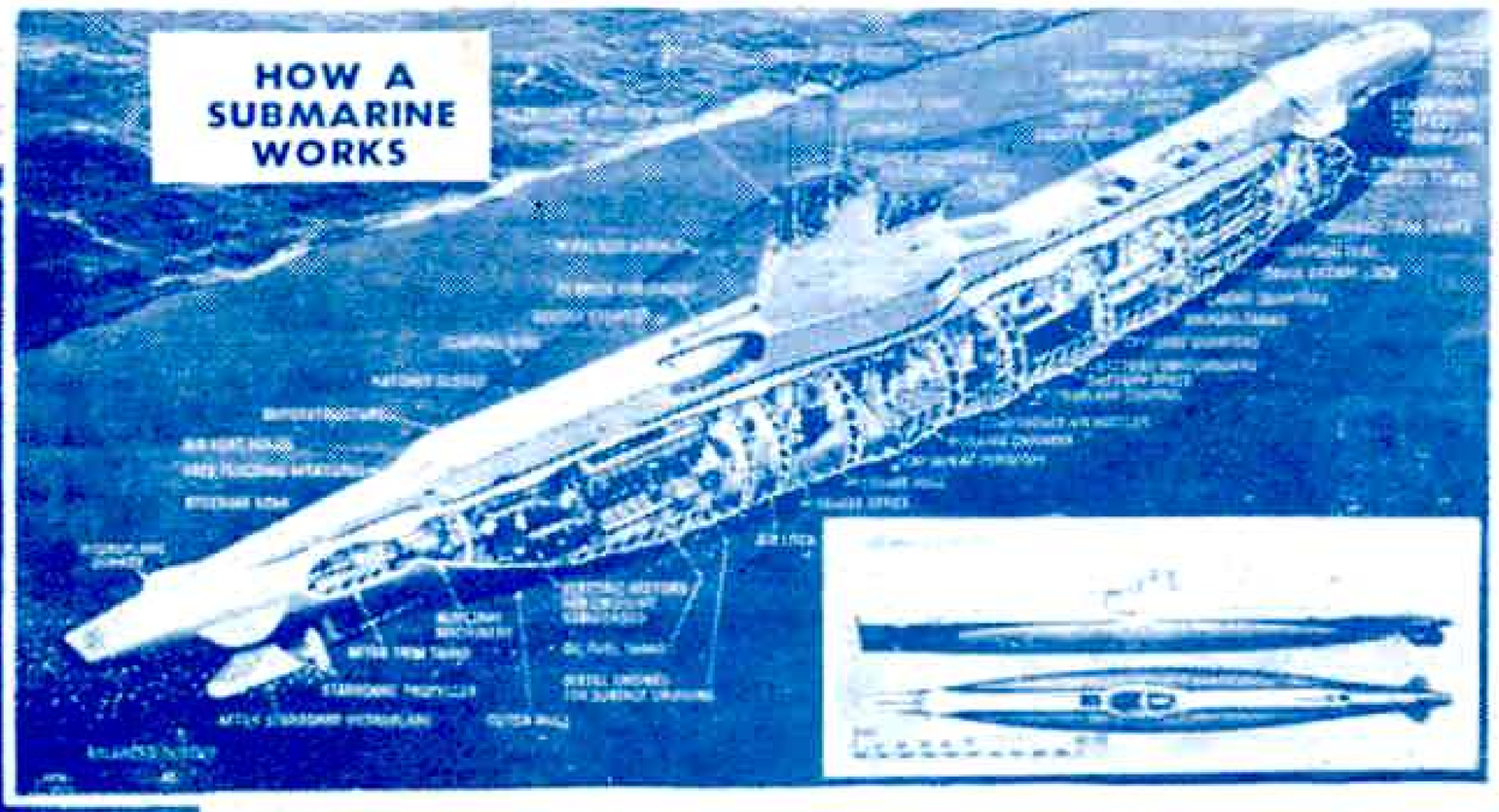

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